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**THE EFFECT OF CONTINUOUS IMPROVEMENT TOOLS ON  
ORGANIZATIONAL PERFORMANCE OF THE DUBAI POLICE:  
THE MEDIATING ROLE OF INNOVATION CULTURE**



**Thesis submitted to  
Othman Yeop Abdullah Graduate School of Business,  
Universiti Utara Malaysia,  
in Fulfillment of the Requirement for the Degree of Doctor of Philosophy**



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Tandatangan  
(Signature)

Pemeriksa Luar : **Prof. Dr. Megat Mohamad Hamdan Megat Ahmad**  
(External Examiner)

Tandatangan  
(Signature)

Pemeriksa Dalam : **Prof. Dr. Shahimi Mohtar**  
(Internal Examiner)

Tandatangan  
(Signature)

Tarikh: **30 June 2019**  
(Date)

Nama Nama Pelajar  
(Name of Student) : **Mohammed Saleh Qasem Alosani**

Tajuk Tesis / Disertasi  
(Title of the Thesis / Dissertation) : **The Effect of Continuous Improvement Tools on Organizational Performance of the Dubai Police: the Mediating Role of Innovation Culture**

Program Pengajian  
(Programme of Study) : **Doctor of Philosophy (Management)**

Nama Penyelia/Penyelia-penyelia  
(Name of Supervisor/Supervisors) : **Prof. Dr. Rushami Zien Yusoff**



Tandatangan



: **Dr. Ali Ali MUSAED AL-ANSI**

**UUM**  
Universiti Utara Malaysia

Tandatangan

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## ABSTRACT

The main objective of this study was to investigate the interaction effects of continuous improvement tools on the organisational performance of the Dubai Police. Specifically, it aims to investigate the mediating influence of innovation culture on the relationship between Six Sigma, Kaizen, benchmarking, and organisational performance. The motivation of this study was driven by the inconsistent findings related to the relationships between Six Sigma, Kaizen, benchmarking, and organisational performance. Due to inconsistent results, various propositions have emerged, pointing to the need to investigate possible mediating variables that could explain the inconsistencies. For that purpose, this study employed systems theory and the resource-based view theory to synchronize the possible relationships among the variables in the conceptual framework. A survey questionnaire was used, and the questionnaires were distributed randomly to 338 sections of the Dubai Police. Of the 252 returned questionnaires, 245 were useable for analysis. PLS-SEM was employed to analyse both direct and indirect relationships among the variables of the study. The findings demonstrated that Six Sigma and innovation culture are significant predictors of organisational performance. It also showed the mediating effect of innovation culture on the relationship between Six Sigma, Kaizen, benchmarking, and organisational performance, supporting the theoretical premises. This study contributes theoretically by bridging the current gap in studying Six Sigma, Kaizen and benchmarking in policing field and practically by contributing to managers in the Dubai Police about the importance using these tools to affect organizational performance positively and also the significant role of innovation culture for implementing these tools successfully.

**Keywords:** Continuous improvement tools, Six Sigma, Kaizen, benchmarking, innovation culture, Dubai Police.

## ABSTRAK

Objektif utama kajian ini adalah untuk menyelidik kesan interaksi alat penambahbaikan yang berterusan ke atas prestasi organisasi Polis Dubai. Secara khusus, kajian ini bertujuan untuk menyiasat pengaruh pengantaraan budaya inovasi terhadap hubungan antara *Six Sigma*, *Kaizen*, penanda aras, dan prestasi organisasi. Motivasi bagi kajian ini didorong oleh penemuan yang tidak konsisten tentang hubungan antara *Six Sigma*, *Kaizen*, penanda aras, dan prestasi organisasi. Disebabkan oleh keputusan yang tidak konsisten ini, telah muncul pelbagai cadangan yang menunjukkan bahawa perlu untuk menyiasat tentang kemungkinan pemboleh ubah pengantara yang boleh menjelaskan ketidakkonsistenan ini. Bagi tujuan tersebut, kajian ini mengaplikasikan teori sistem dan teori berdasarkan sumber yang bertujuan untuk menyelaraskan kebarangkalian hubungan antara pemboleh ubah dalam kerangka konsep. Soal selidik kajian telah dijalankan dan soal selidik ini telah diedarkan secara rawak ke 338 bahagian Polis Dubai. Daripada 252 soal selidik yang dikembalikan, 245 soal selidik boleh digunakan untuk tujuan analisis. PLS-SEM telah digunakan untuk menganalisis hubungan langsung dan hubungan tidak langsung di antara pemboleh ubah kajian. Hasil kajian menunjukkan bahawa *Six Sigma* dan budaya inovasi adalah peramal yang signifikan terhadap prestasi organisasi. Hal ini juga menunjukkan kesan pengantara budaya inovasi terhadap hubungan antara *Six Sigma*, *Kaizen*, penanda aras dan prestasi organisasi bagi menyokong teori premis. Kajian ini menyumbang secara teoritis dengan merapatkan jurang semasa dalam mengkaji *Six Sigma*, *Kaizen* dan penanda aras dalam bidang kepolisan dan secara praktikal dengan menyumbang kepada pengurus di Polis Dubai tentang pentingnya menggunakan alat ini untuk mempengaruhi prestasi organisasi secara positif dan juga peranan penting budaya inovasi untuk melaksanakan alat-alat ini dengan jayanya.

**Kata kunci:** Alat peningkatan berterusan, *Six Sigma*, *Kaizen*, penanda aras, budaya inovasi, Polis Dubai

## ACKNOWLEDGEMENT

In the name of Allah, the most Gracious, the most Merciful. All praise to the Almighty, the One who has responded to my prayers in various ways and blessed me with patience, courage, and fortitude throughout this research. Peace and prayers be upon our beloved Prophet Mohammad, his families, companions and followers.

My foremost gratitude and thanks go to my supervisor, Prof Dr Rushami Zein Yousef for his professional guidance, continuous support, encouragement and kindness during my study journey. He has devoted his expertise and precious times in guiding me to reach up to this level. Thank you very much; all your endeavours and efforts are appreciated forever.

I also would like to thank those who have assisted me during the proposal defence, data analysis, and final thesis write-up. My thanks also go to everybody in UUM, including OYAGSB, COB and SBM staff for their cooperation and supports. I would like to also extend my deepest gratitude to all my friends and colleagues for their constructive comments and invaluable suggestions.

My deep appreciation and love go to all my family members who have shared with me their joy and frustration during my study. My love for my parents for their motivation, dedication, and prayers. My respect for my brothers and my sisters. My endless love to my wife for her long endurance, spiritual supports and true love, and my children, Abdulaziz, Zahra, and Shaima. May Allah bless us all the time.

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## List of Abbreviations

BSC	Balanced Scorecard
CMV	Common Method Variance
CR	Composite Reliability
CSFs	Critical Success Factors
CTQCs	Critical to Quality Characteristics
DMADV	Define, Measure, Analyse, Design, and Verify
DMAIC	Define, Measure, Analyse, Improve, and Control
DPMO	Defects Per Million Opportunities
DEGP	Dubai Government Excellence Program
EFA	Exploratory Factor Analysis
EU	European Union
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
GoF	Goodness of Fit
ISO	International Organization for Standardization
KPI	Key Performance Indicator
KPIV	Key Process Input Variable
MOI	Ministry of Interior
NPM	New Public Management
PDCA	Plan, Do, Check, and Act.
PLS	Partial Least Squares

SEM	Structural Equation Modelling
SD	Standard Deviation
RBV	Resource-Based View
SSCCI	Six Sigma Centre for Continuous Improvement
SIPOC	Suppliers, Inputs, Process, Outputs, and Customers
SEM	Structural Equation Modelling
SKGEP	Sheikh Khalifa Government Excellence Program
SPSS	Statistical Package for Social Science
TPM	Total Productive Maintenance
TPS	Toyota Production System
TRADE	Term of references, Research, Acquire, Deploy, and Evaluate
TQM	Total Quality Management
UAE	United Arab Emirates
WEF	World Economic Forum

# CHAPTER ONE

## INTRODUCTION

### 1.1 Introduction

The present chapter highlights the background and problem statement of the study. It also covers the significance, research questions and objectives, the problem statement, and the operational definition of the key terms, and the organisation of the thesis.

### 1.2 Background of the Study

In the past three decades, the United Arab Emirates (UAE) has experienced significant socio-historical changes, resulting in a substantial development in its economy (Choi, Khajavy, Raddawi, & Giles, 2019; Jones, 2019). The UAE has managed to transform its economy from one based on agriculture to the third largest in the Middle East and the third highest gross domestic product (GDP) per capita in the world (Al-mulali & Che Sab, 2018). Some of the favourable attributes that the UAE boasts include a safe environment, abridged procedures, and timings for taking the initiative in business and developing the private sector (Ahmed, 2015).

It is important for a developing economy to demonstrate that it utilizes its resources efficiently to create a value domestically as well as providing a safe and secure environment to ensure the continuation and consolidation of such development. Accordingly, the UAE is striving to maintain a stable business environment and invite international businesses to make long-term investments in the country (Bishr, 2019).

Such attributes would act as a magnet for more foreign investors and encourage entrepreneurs to establish their business in the country, reflecting positively on the economy. Thus, to maintain these features, the UAE must reinforce the performance of its government entities and address obstacles by employing an effective management system and technique (Bishr, 2019).

For that, the government of the UAE launched Vision 2021, which proposes that the UAE becomes one of the best countries in the world (vision2021.ae, 2018). This vision has been translated to action plans consists of six main pillars, which represent the primary sectors of government (vision2021.ae, 2018). Through this vision, the UAE government is seeking to “create and maintain a sustainable and diversified economy, flexible in adopting new economic models, and capitalising on global economic partnerships to guarantee long-term prosperity for current and future generations of Emiratis” (Government.ae, 2019). To fulfil this, the government of the UAE has set twelve key performance indicators (KPIs) to achieve its vision focuses on non-oil real GDP growth, enhancing innovation, providing better services to attract international investments, etc. (Government.ae, 2019). Thus, all government authorities have been under pressure to fulfil that vision.

Managers in these authorities are confronted with pressures to improve services to the community. Efficiency and effectiveness have become slogans in this process, as managers aim to improve services while minimizing resource consumption (Bayley, 1985; Matusiak, King & Maguire, 2017; Seraphin, 2017). This is especially important as these government entities have a pivotal role in the economy of the country (Al Meqbaali & Kasim, 2018). Studies report that these entities make a substantial contribution of between 20% and 30% to the GDP in economically developed

countries (Arundel, Bloch, & Ferguson, 2019; Eurostat, 2012). Given the high economic weight of such entities, interest has increased in such entities and how to improve their performance, quality services, and efficiency through gradual improvements and innovation (Arundel, Casali, & Hollanders, 2015; Chen, 2018; Elias & Davis, 2018).

Besides, the global financial crisis of 2007-2008 emphasized the importance of adopting effective performance management of government entities (Arnaboldi, Lapsley, & Steccolini, 2015). These pressures have intensified the need for making the best use of resources in these entities. This is in the midst of an uncertain environment in which traditional practices for improving performance have experienced reverses. Scholars have mentioned that continuous improvement tools (Elias & Davis, 2018) with innovative capabilities (Keiser & Koch, 2008) can assist organisations in accomplishing the required results (Elias & Davis, 2018; Singh & Singh, 2012; Taniguchi & Onosato, 2018). Practitioners and scholars have become increasingly interested in public sector innovations (Bertot, Cochran, & Robertson, 2018; Keohane, 2013; Osborne & Brown 2011; Walker, 2014) due to its role in improving problem-solving capacities and enhancing quality services (Alfin, Fuad, Nur, Yuanita, & Prahani, 2019; Damanpour & Schneider, 2008). This concept has attracted the researcher to study an innovation culture alongside with employing continuous improvement tools to attain considerable success.

Six Sigma, Kaizen, and benchmarking are the most popular tools used for continuous improvement (Bhuiyan & Baghel, 2005; Elnathan, Lin & Young, 1996; Galli, 2019; Luo, Hong, Chen & Piette, 2017; Prabhakar, 2017; Spector, 2006). These tools could improve the business processes of organisations, resulting in enhanced organisational

performance in areas such as the quality of product and service, business costs, cycle time, market penetration, and customer satisfaction (Scott, Wilcock, & Kanetkar, 2009) and in sustaining a competitive advantage (Antony, Kumar, & Madu, 2005; Da Silva, Filho, Agostinho, & Junior, 2019; Larsson, Strand & Persson, 2017).

For the successful implementation of continuous improvement tools, studies have revealed that creating an appropriate culture is critical (Antony & Banuelas, 2002; Cheng, 2007; Kwak & Anbari, 2004; Ng & Hempel, 2017). It is also important to take advantage of the innovation capabilities of employees to enhance improvements and achieve a sharp jump in performance. Innovation, as one of the performance drivers, is directly related to the concepts of implementation, acceptance, and generation of new services, products, ideas, practices, and processes. Studies also have shown that innovation has direct and indirect effects on the performance of an organisation because establishing a culture through innovation enables the organisation to achieve superior performance and a better competitive position. Such innovation culture has a significant role in facilitating and enhancing the implementation of continuous improvement tools in organisations, which, in turn, lead to the provision of high-quality services and improved organisational performance. Therefore, combining these continuous improvement tools with innovative capabilities helps to achieve remarkable results in performance (Elias & Davis, 2018; Keiser & Koch, 2008; Singh & Singh, 2012; Taniguchi & Onosato, 2018)

However, studies have reported that the application of these tools has been conducted mostly in private organizations and their application in public organizations are still limited and immature (Al-Aomar, Aljeneibi, & Almazroui, 2016; Al-Aomar, Al-Mansouri, & Al-Laban, 2017; Alsyouf, Humaid, & Al Kamali, 2014; Alsyouf et al.,

2018; Dulaimi & Ellahham, 2016; Jabnoun & Sedrani, 2005; Small, Al Hamouri & Al Hamouri, 2017) particularly in developing countries (Dulaimi & Ellahham, 2016; Glover et al., 2014) in the Middle East countries (Albliwi et al., 2017; Farouk et al., 2016), including the UAE (Al-Aomar, Aljeneibi, & Almazroui, 2016; Al-Aomar, Al-Mansouri, & Al-Laban, 2017; Alsyouf, Humaid, & Al Kamali, 2014; Alsyouf et al., 2018; Dulaimi & Ellahham, 2016; Jabnoun & Sedrani, 2005; Small, Al Hamouri & Al Hamouri, 2017). Therefore, in seeking to investigate these tools on organizational performance in the public sector of developing countries, this study focused on the UAE. The reason behind this choice is because the public sector in the UAE is more matured and developed compared with others in the Middle East and Arab region (Al-Ahbab, Singh, Gaur, & Balasubramanian, 2017; Anadol, Youssef, & Thiruvattal, 2015). The UAE is also ranked as one among top ten countries that have improved the most since 2012 (WEF, 2015), and the seventh in the world and first in the region in competitiveness (Awamleh, 2019). For these reasons, the public sector in the UAE offers a suitable scope to study these tools.

In this regard, the researcher conducted extensive research on using Six Sigma, Kaizen, and benchmarking in the UAE government authorities. The government of the UAE consists of 49 federal government (UAE Cabinet, 2019) and 204 local authorities (Government.ae, 2019). An extensive found that using these tools remains limited and immature, which is in line with many previous studies that have confirmed that employing these tools is in the early stage in the UAE (Al-Aomar, Aljeneibi, & Almazroui, 2016; Al-Aomar, Al-Mansouri, & Al-Laban, 2017; Alsyouf, Humaid, & Al Kamali, 2014; Alsyouf et al., 2018; Dulaimi & Ellahham, 2016; Jabnoun & Sedrani, 2005; Small, Al Hamouri & Al Hamouri, 2017).

A comparison among all these government authorities in the UAE found that the Ministry of Interior (MOI) was one of the best public sector authorities in the UAE (SKGEP, 2018). The MOI achieved the first rank among all other public authorities in the UAE (SKGEP, 2018; MOI, 2019). It has been a pioneer in using modern techniques, strategies, and management tools (MOI, 2019). The structure of MOI includes seven police agencies: Abu Dhabi Police, Dubai Police, Sharjah Police, Ajman Police, Umm Al Quwain Police, Fujairah Police, and Ras Al Khaimah Police. Although some of these agencies applied some of these tools temporarily to address certain cases, they did not employ continuous improvement tools regularly. Thus, none of the government authorities in the UAE, including local authorities in Dubai and even police agencies, applied all of these three tools regularly and systematically except for the Dubai Police. Therefore, the Dubai Police were chosen as a scope of the study. The reason for that was due to its maturity in employing continuous improvement tools compared with other government authorities and police agencies in the UAE.

The Dubai Police are one of the government authorities in the UAE responsible for enforcing the law within the border of the Emirate of Dubai as well as executing the strategy of the Dubai Government by reinforcing safety and security and preparing to confront various challenges (Alosani, & Yusoff, 2018). Its objectives are to promote the quality life of the local community by operating in adhering to the constitutional rights of law enforcement and preserving the security and safety of the community. Successfully achieving these ends, requires the application of a strategy to address any errors and provide ideal services (See Appendix A for more details).

### 1.3 Problem Statement

In a turbulent and competitive business environment, organisations encounter many challenges as a result of pressure from competitors, increasing customer needs, and expectations to improve the quality of services and products (Azzemou & Nouredine, 2018; Epstein & Yuthas, 2017; Johari, Shamsudin, Yean, Yahya, & Adnan, 2019; Lawson, Cousins, Handfield, & Petersen, 2009; Narasimhan, Narayanan, & Srinivasan, 2010). Similarly, in public sector organisations, governments confront a growing pressure to provide services and meet the expectations of customers (Arnaboldi, Lapsley, & Steccolini, 2015; Finkler, Smith, & Calabrese, 2019; García-Navarro, Ramírez, & Ruíz-Ortega, 2019; Johari et al., 2019; Moran, 2016).

Furthermore, the performance of public sector organisations appears not to reach the level attained by private organisations (Bourmistrov, Grossi, & Haldma, 2019; De Waal, 2010; Greener, 2019; Van Dooren, Bouckaert, & Halligan, 2015). The reason for the low performance of public organisations is the lack of adopting and implementing effective tools and techniques to help them improve performance. Besides, public organisations are widely known as a complex setting for study and executing new initiatives (Arnaboldi et al., 2015). They have been labelled as an area of deep-rooted complexity (Lapsley & Skærbæk, 2012) as a result of managerial culture and various political impacts (Arnaboldi et al., 2015).

The service quality in government organisations and police agencies, in particular, is a central concern (Allen & Sawhney, 2015) because of the link of these services to the life of the community (Doss et al., 2017). Police agencies as a part of public sector organisations aim to boost the rule of law, achieve public safety and public welfare, reduce crime, and protect human rights (Brantingham et al., 2017; Legrand & Bronitt,

2012). To achieve these objectives, these agencies need to continuously participate in a set of series of administrative manoeuvres to fulfil social, economic, technological, demographic, and political demands. Consequently, the needs for improving service delivery have emerged in terms of efficiency and effectiveness (Brantingham et al., 2017; Legrand & Bronitt, 2012). Such challenges have put these agencies under pressure to adopt appropriate and modern approaches to improve their performance and meet the expectations of customers (Ahuja & Khamba, 2008; Warner, 2019). Thus, employing continuous improvement techniques could help these agencies improve their organisational performance and sustain competitive advantage.

In view of the challenges being faced by police around globe as a result of the versatility and complexity of the functions and limited resources (Asif, Shahzad, Awan & Akdogan, 2018), continuous improvement tools represent a vital factor for improving competitiveness (Azzemou & Nouredine, 2018; Sraun & Singh, 2017), developing public services (Antony, Rodgers, & Gijo, 2016a), and increasing the efficiency of resource management (Cheng & Chang, 2012). These tools are considered a practical approach to improve performance and gain competitive advantage (Singh & Singh, 2012) and a way to help organisations grow and prosper (Bhuiyan & Baghel, 2005).

Continuous improvement practices employ some tools and techniques. Six Sigma, Kaizen, and benchmarking are the well-known and most used tools in organisations for improvement purposes (Alhuraish, Robledo, & Kobi, 2017; Bhuiyan & Baghel, 2005; Elnathan et al., 1996; Sodhi, Singh, & Singh, 2019; Sony, 2019; Spector, 2006; Sraun & Singh, 2017). Unfortunately, empirical studies on the impact of continuous

improvement tools on the performance of government agencies and particularly in policing have been less than encouraging.

Six Sigma methodology has set a modern approach to excellence (Albeanu & Hunter, 2017). It has gained significant attention, recognition and acceptance in various sectors as a framework for continuous improvement (Antony, Rodgers, & Cudney, 2017a; Smętkowska & Mrugalska, 2018). Six Sigma can also enhance the reputation of an organisation among its customers (Goh & Xie, 2004) and assist leaders to change their organisation by providing suitable techniques and methods for improvement. Therefore, adopting it is a philosophy and long-term business strategy for continuous improvement (Camgoz-Akdag, 2007) as well as attaining competitive advantage (Sony, 2019).

The bulk of evidence revealed that Six Sigma was positively and significantly related to organisational performance (Ahmed, Abd Manaf, & Islam, 2018; Ali, Choong, & Jayaraman, 2016; Gunawan & Karimah, 2017; Hilton, Balla & Sohal, 2008; Hwang, Lee, & Seo, 2017; Jacobs, Swink & Linderman, 2015; Mishra & Sharma, 2017; Mustafa & Jamaluddin, 2017; Nayeri & Rostami, 2016; Patyal & Koilakuntla, 2017; Shah, Chandrasekaran, & Linderman, 2008; Sin, Zailani, Iranmanesh, & Ramayah, 2015; Singh, Singh, Singh, & Sandhu, 2017; Swink & Jacobs, 2012; Uluskan, Godfrey, & Joines, 2017; Zu, Fredendall, & Douglas, 2008). Six Sigma has also a role in handling customer complaints (Abreu, Sousa, & Lopes, 2012), enhancing quality management (Al-Aomar & Chaudhry, 2018; Al Khamisi, Hernandez, & Khan, 2018; Braunscheidel, Hamister, Suresh, & Star, 2011; Raja, Raju, Rajkanth, & Nagaraj, 2018), saving time and cost (Bateh & Farah, 2018; Pande, Neuman, & Cavanagh,

2000; and enhancing innovation (He, Deng, Zhang, Zu & Antony, 2017; Braunscheidel et al., 2011).

However, even though the association between Six Sigma and performance has been positively established, the value of the correlation coefficient as reported in past studies is inconsistent as shown in Table 2.2. The values ranged from negligible correlation (Ali et al., 2016), low correlation (Jacobs et al., 2015; Mustafa & Jamaluddin, 2017; Shah et al., 2008; Sin et al., 2015; Uluskan et al., 2017), moderate correlation (Gunawan & Karimah, 2017; Linderman et al., 2006; Patyal & Koilakuntla, 2017; Zu et al., 2008), substantial correlation (Habidin & Yusof, 2012; Hwang et al., 2017), and very high correlation (Nayeri & Rostami, 2016). Notably, these inconsistencies could be because past studies did not empirically consider the mediating factor of culture (Antony, 2017; Antony et al., 2018; Zu et al., 2010) and ignored cultural barriers (Antony, 2017; Rodgers, Antony, & Marshall, 2018) especially in a complicated culture of police agencies (Demirkol & Nalla, 2019). Past studies showed that the successful implementation of Six Sigma relied on the establishment of an appropriate culture (Antony & Banuelas, 2002; Cheng, 2007; Kwak & Anbari, 2004; Ng & Hempel, 2017).

Also, noteworthy to point out is that Six Sigma's familiarity is within western manufacturing (Albliwi, Antony, Arshed, & Ghadge, 2017; Albliwi, Antony, Lim, & van der Wiele, 2014) while it is less familiar in the Middle East (Albliwi et al., 2017). Its application in the public sector is still limited and immature (Antony et al., 2017a; Antony, Snee & Hoerl, 2017c) including in police agencies (Doss, 2014). There is also a shortage of studies that focused on the implementation Six Sigma in the public sector (Chiarini, 2013; Kuvvetli & Firuzan, 2017), and even more so in police agencies

(Antony, Rodgers, & Cudney, 2017b; Patyal & Maddulety, 2015). Besides, Shokri (2017) analysed studies and publications on Six Sigma in the last two decades and found a gap in the investigations in the service industry. He revealed that the majority of studies focused on limited areas and sectors and ignored other sectors such as the service industry. In policing, there are several initiatives of using Six Sigma to improve processes among the police agencies. However, such initiatives lack maturity (Doss, 2014) and empirical investigations on Six Sigma implementation in this field are still limited (Patyal & Maddulety, 2015).

Further, some argue that Six Sigma is still subject to the same criticisms and limitations of traditional quality management (Dahlgaard & Dahlgaard-Park, 2006) and misunderstanding, undermining its effectiveness (Lee-Mortimer, 2006; Mostafa, Dumrak, & Soltan, 2013; Rodgers et al., 2018). Such criticism suggests that it is important to understand the contextual variables (Schroeder, Linderman, Liedtke, & Choo, 2008) and cultural values (Zu, Robbins, & Fredendall, 2010) that could either facilitate or hinder the success of Six Sigma implementation (Schroeder et al., 2008). It is argued that creating an appropriate culture is critical to the successful implementation of Six Sigma (Antony & Banuelas, 2002; Cheng, 2007; Galli, 2019; Kwak & Anbari, 2004; Ng & Hempel, 2017). However, despite the importance of culture in the successful implementation of Six Sigma (Antony, 2004b; Goffnett, 2004), studies that investigated the influence of Six Sigma on culture (Zu et al., 2010) are limited. Thus, Schroeder et al. (2008) advocated that the implementation of Six Sigma and the required changes in culture and structure to achieve the needed success are investigated.

Kaizen is also one of the continuous improvement tools that can be used in personal and working life (Imai, 1986). It is considered a tool for problem-solving and making improvements over time (Bortolotti et al. 2018; Imai, 1986; Sawada, 1995). Studies found that Kaizen correlated positively and significantly with organisational performance (Abadi, Haming, Baharuddin, & Mahmud, 2018; Adesta, Prabowo, & Agusman, 2018; Anh, Yen & Matsui, 2015; Asaad, Rohaizah, & Yusoff, 2015; Hofer, Eroglu, & Hofer, 2012; Mutua, Ngugi, & Odhiambo, 2018; Nguyen, 2019; Rahman, Laosirihongthong, & Sohal, 2010; Shah, Ganji & Coutroubis, 2017; Shurrab & Hussain, 2018; Yasar, Sezen, & Karakadilar, 2017; Soltani & Amanat, 2019; Yang, Hong, & Modi, 2011; Zhou, 2016; Zarinah, Farhana, & Nadiah, 2017). It has also a significant role in increasing productivity (Ee Shuang, 2012), enhancing performance and improving working life of workers (Aurel, Andreea, & Simina, 2015; Hyland, Milia & Terry, 2004; Von Thiele Schwarz, Nielsen, Stenfors-Hayes, & Hasson, 2017). However, the level of correlation coefficient was inconsistent in past studies as shown in Table 2.6 (Asaad et al., 2015; Fullerton, McWatters, Fawson, 2003; Rahman et al., 2010; Sajan, Shalij, Ramesh, & Augustine, 2017; Yang et al., 2011; Yasar et al., 2017). Another gap in the literature is the limited number of empirical studies in the service industry (Shakoor, Qureshi, Jadayil, & Jaber, 2017), especially in public sector organisations (Antony et al., 2016a; Bhatia & Drew, 2006; Delias & Delias, 2017; Pedersen & Huniche, 2011; Suarez-Barraza & Miguel-Davila, 2014), including police organisations (Antony et al., 2017b; Barton, 2013b; Barton & Matthews, 2015; Barton & Matthews, 2017).

Further, studies that investigated and assessed the impact of Kaizen in the public sector are limited (Radnor & Boaden, 2008; Suarez-Barraza, Smith, & Mi Dahlgaard-Park, 2009; Suarez-Barraza & Miguel-Davila, 2014). Also, the majority of investigations

that employed survey research and regression analysis (Glover, Farris & Aken, 2014) concentrated on private sector organisations (Suarez-Barraza & Miguel-Davila, 2014). Even more so, Kaizen studies in developing countries are inadequate (Glover et al., 2014; Jasti, & Kodali, 2015), and its application in the UAE is still in an early stage (Dulaimi & Ellahham, 2016; Small, Al Hamouri & Al Hamouri, 2017). It is argued that the lack of studies in this area is because of the small number of academic researchers in this field (Bateman, 2005; Farris, Van Aken, Doolen, & Worley, 2009; Glover et al., 2014), and a limited group of methodologies to explain the phenomena (Glover et al., 2014). Additionally, less attention has been given to a continuous improvement culture particularly in a complex culture such as policing that could handicap proper implementation of Kaizen (Demirkol & Nalla, 2019; Henrique, 2018).

In light of previous arguments, it can be said that culture represents the most critical factor that leads to achieving the desired success in Kaizen implementation projects (Achanga, Shehab, Roy, & Nelder, 2006; Alkhorairif, McLaughlin, & Rashid, 2019; Garcia, 2015; Oki, 2012). That is, ignoring such culture when applying Kaizen may hinder from the expected success (Alkhorairif et al., 2019; Pakdil & Leonard, 2015; Garcia, 2015).

Previous studies also only focused on the application of Kaizen in service sector agencies in developed countries; however, police agencies have received less attention (Antony et al., 2017b; Barton, 2013b; Barton & Matthews, 2015; Barton & Matthews, 2017). Although Kaizen has been found to improve organisational performance in many sectors, there is no evidence that it has achieved any success in police agencies. Also, to date, there is still no example of the application of Kaizen in police agencies

in other countries in the Middle East including UAE. Therefore, this study attempts to guide the application of Kaizen in police agencies and its effect on performance.

Another continuous improvement tool the current study focused on is benchmarking. Benchmarking is one of the widely recommended tools for performance improvement (Alosani, Al-Dhaafri, & Yusoff, 2016; Gerrish & Spreen, 2017; Elnathan et al., 1996; Sweeney, 1994; Vaziri, 1993; Venetucci, 1992). It is a systematic technique used to measure organisations against others in best practices. Benchmarking aims to help organisations gain a competitive advantage by borrowing ideas from the others and adapting them in a new template to achieve the organisation's objectives (Besterfield, Besterfield-Michna, Besterfield, & Besterfield-Sacre, 2003; Prabhakar, 2017). According to Gerrish and Spreen (2017), benchmarking promotes performance management, driving to the range of best practices and enhanced performance. It is considered one of the most substantial improvement tools that can assist organisations in improving their performance (Maire, Bronet, & Pillet, 2005; Saunders et al., 2016) and sustain organisational development (M'itonga, 2017).

Many empirical studies have showed that benchmarking positively and significantly impacted organisational performance (Abazeed, 2017; Attiany, 2009; Attiany, 2014; Carr & Smeltzer, 1999; Drew, 1997; Hashim, Yusoff, & Mat, 2012a; Kariuki & Ochiri, 2017; Kerandi, Nyaoga, Bosire, & Nyambega, 2014; Maiga & Jacobs, 2004; Mehralian, Nazari, Nooriparto, & Rasekh, 2017; Salam & Smadi, 2016; Sanchez-Rodriguez, Martinez-Lorente, & Clavel, 2003; Nyaoga, Mundia, & Irungu, 2013; Sawasdiraksa, 2015; Voss, Ahlstrom, & Blackmon, 1997; Zoakah, Goyit, & Nmadu, 2017). However, these studies reported inconsistent correlation coefficients (Abazeed, 2017; Attiany, 2009; Attiany, 2014; Carr & Smeltzer, 1999; Hashim et al., 2012a;

Kerandi et al., 2014; M'itonga, 2017; Maiga & Jacobs, 2004; Nyaoga et al., 2013; Salam & Smadi, 2016; Sanchez-Rodriguez et al., 2003; Sawasdiraksa, 2015; Voss, et al., 1997) as shown in Table 2.7. Also, Williams, Brown, and Springer (2012) mentioned that benchmarking has been criticised for not able to achieve the required results. However, according to Hanson and Voss (1995), the successful implementation of benchmarking requires an appropriate culture, teams, energy, and vision. Hanson and Voss thus suggested to perform an initial analysis before conducting benchmarking projects and build an appropriate culture that allows employees to participate by sharing ideas to avoid the impacts of implementation barriers.

Culture plays a powerful impact on an organisation and its competitiveness position (Barney, 1986; Hall, 1993; Gürlek & Tuna, 2018; Shen, 2018; Wernerfelt, 1984). It is one of the most important elements that influence an organisation's success by shaping values, beliefs, and commitment of employees to confront rivals and achieve organisational objectives (Kuratko & Welsch, 2004). Studies found that culture enables organisations to initiate innovative activity (Buschgens, Bausch, & Balkin, 2013; Salge & Vera, 2012), enhances their innovation capability (Hogan & Coote, 2014), and leading to improved performance (Lee, Woo & Joshi, 2017a).

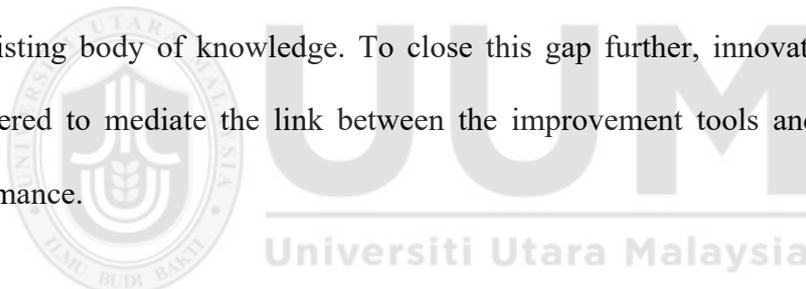
Several studies demonstrated that innovation culture positively and significantly influenced organisational performance (Anderson, El Harbi, & Amamou, 2012; De Brentani, 2001; De Brentani & Kleinschmidt, 2004; Kuo & Tsai, 2017; Lee, Woo & Joshi, 2017a; Rosenbusch, Brinckmann, & Bausch, 2011; Salim & Sulaiman, 2011; Stock, Six, & Zacharias, 2013; Wei, Guopeng, & Xiangyuan, 2012; Zhang & Huang, 2010). However, this orientation towards an “innovation culture” is much more

pronounced in Western countries than other countries (Dabić, Lažnjak, Smallbone, & Švarc, 2018), and studies about it in the Middle East are still limited (Farouk, Abu Elanain, Obeidat & Al-Nahyan, 2016; Saad & Abbas, 2019). Hence, studies to investigate the influence of innovation culture on organisation's performance dimensions (Sadikoglu & Zehir, 2010) and validate previous research findings (Evangelista & Vezzani, 2010; Gunday et al., 2011; Yuan, Zhongfeng & Yi, 2010) are justified. Further, innovation in public organisations is still in the early stage (Ham, Lee, Kim, & Choi, 2015). Most works focused on manufacturing companies with limited empirical evidence in the public sector (Arundel, Bloch, & Ferguson, 2016; Van Acker & Bouckaert, 2017) including police agencies even though the literature suggests that culture has a substantial role in either supporting or hindering public sector innovation (Laegreid, Roness & Verhoest, 2011) and executing incremental improvements (Osborne & Brown, 2011).

In spite of the importance of continuous improvement tools to achieve the required results, many organisations cannot achieve the most optimal results (Galli, 2019; Oakland, 2014), which could possibly be due to a lack of strategic vision and intention (Antony, 2014; Radnor, Holweg & Waring, 2012; Rodgers et al., 2018), inappropriate culture (Galli, 2019; Henrique, 2018), and a lack of know-how to use continuous improvement tools properly (Galli, 2019). Studies that investigate the importance of these tools in developing countries (Chakraborty, Mutingi, & Vashishth, 2019) are also lacking, and there is limited evidence of their implementation in policing (Rodgers et al., 2018).

Another point worthy of note is the critical importance of the integration of Six Sigma, Kaizen, and benchmarking for performance improvement. However, this part of the

scientific investigation is still lacking (Galli, 2019). Much research has focused on models and concepts of continuous improvement but only in specific applications and on a model-by-model basis only (Bhamu & Singh, 2014; Dale, 2015; Galli, 2018; Parast, 2011; Wang, Chen, & Chen, 2012; Zehir, Ertosun, Zehir, & Muceldilli, 2012). No studies have investigated the overlaps and relationships of these tools (Galli, 2019). Studies showed that the most successful way to get the full benefit of continuous improvement models is by employing these models as one set (Galli, 2019). Therefore, this research is an endeavour to bridge this gap in the literature by combining the most important improvement tools. Besides, the literature illustrates the scarcity of studies on Six Sigma, Kaizen, benchmarking, and organisational performance in the public sector and particularly in policing. The present study was an attempt to fill this gap in the existing body of knowledge. To close this gap further, innovation culture was considered to mediate the link between the improvement tools and organisational performance.



Countries in the region including the UAE have been seeking to achieve high performance in all fields including the public sector. The responsibility of the Dubai Government is to ensure the security and safety of the community through its police system. Dubai Police, one of the Dubai Government authorities, is committed to fulfilling its obligations to the government and customers by implementing the government's strategy that focuses on achieving excellence in safety and security not only locally but also globally. Therefore, to be capable of providing a safe and attractive environment, it is vital for the Dubai Police to build an innovation culture and adopt innovative practices to excel and deliver leading services. The Dubai Government has announced its strategic innovation plan that should be followed and implemented by all government entities in Dubai. Therefore, the Dubai Police has to

align its mission with this strategy by being innovative as a critical player in the strategy implementation.

Although the Dubai Police is seen as one of the most advanced agencies in the Gulf Cooperation Council (GCC) region (Elnaghi, Alshawi, Kamal, Weerakkody, & Irani, 2018) and its performance has witnessed a remarkable improvement, this performance is still not satisfactory when compared to the government's ambitious plans and its results of the past years. The Dubai Statistics Centre (2016) showed that the Dubai Police did not achieve its targets in the past three years. Figure 1.1 illustrates the high level of crimes, which requires improvement in its performance to meet the government goals.

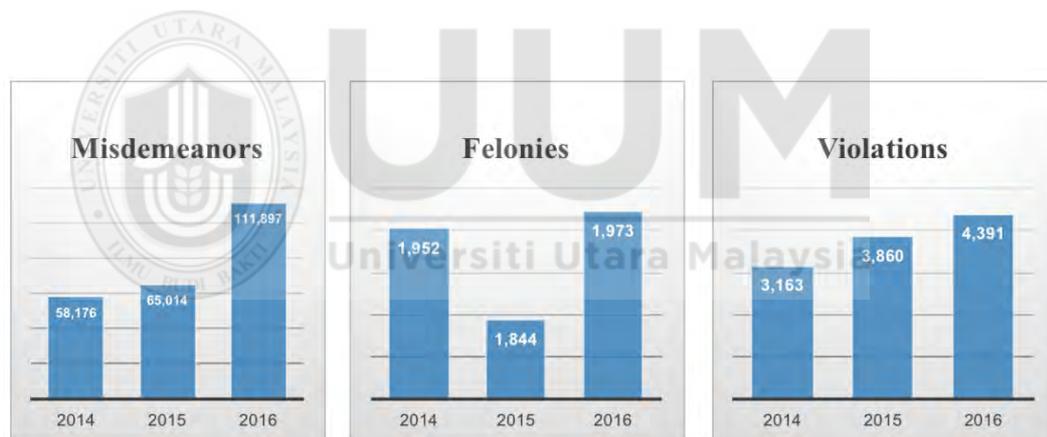


Figure 1.1  
*Crimes in Dubai*  
Source: Dubai Statistics Centre (2016)

Moreover, in the Dubai Government Excellence Program (DEGP), the Dubai Police achieved a modest performance achievement, which is considered a drop, compared to previous years (DGEP, 2017); which was maintained the first place over the past years outperforming all other authorities in the Emirate of Dubai (see Figure 1.2).

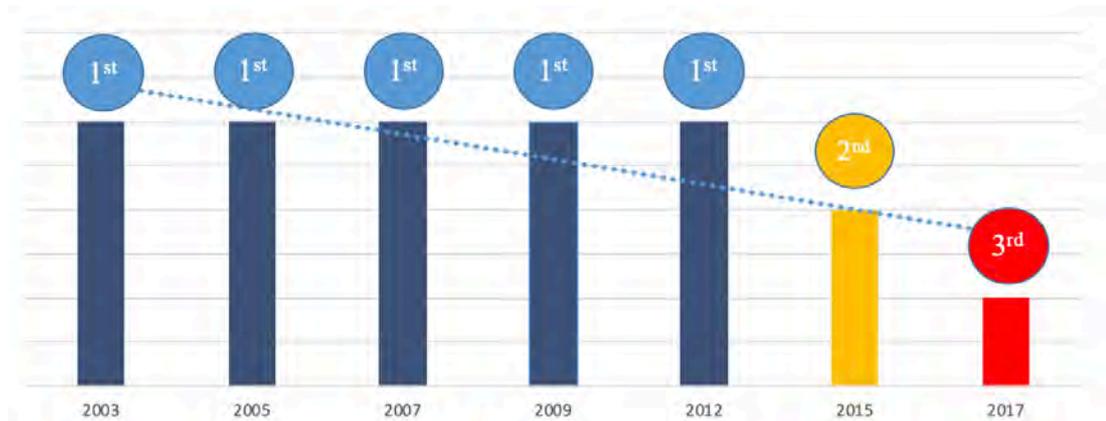


Figure 1.2  
*Results of the Dubai Police*  
 Source: DGEP (2017)

In a nutshell, the present study pursued to fill the gap in the literature and practice by examining the association between continuous improvement tools and organisational performance in the Dubai Police.

#### 1.4 Research Questions

This study examined the relationships between Six Sigma, Kaizen, benchmarking, innovation culture, and organisational performance. It aimed to answer the following questions:

1. What is the effect of Six Sigma on the organisational performance of the Dubai Police?
2. What is the effect of Kaizen on the organisational performance of the Dubai Police?
3. What is the effect of benchmarking on the organisational performance of the Dubai Police?
4. What is the effect of Six Sigma on the innovation culture of the Dubai Police?

5. What is the effect Kaizen on the innovation culture of the Dubai Police?
6. What is the effect of benchmarking on the innovation culture of the Dubai Police?
7. What is the effect of innovation culture on the organisational performance of the Dubai Police?
8. Does innovation culture mediate the relationship between Six Sigma and the organisational performance of the Dubai Police?
9. Does innovation culture mediate the relationship between Kaizen and the organisational performance of the Dubai Police?
10. Does innovation culture mediate the relationship between benchmarking and the organisational performance of the Dubai Police?

### **1.5 Research Objectives**

The broad purpose of this study was to examine the effect of Six Sigma, Kaizen, and benchmarking on organisational performance by involving innovation culture as a mediating factor. The specific objectives of the research were:

1. To examine the effect of Six Sigma on the organisational performance of the Dubai Police.
2. To examine the effect of Kaizen on the organisational performance of the Dubai Police.

3. To examine the effect of benchmarking on the organisational performance of the Dubai Police.
4. To examine the effect of Six Sigma on the innovation culture of the Dubai Police.
5. To examine the effect of Kaizen on the innovation culture of the Dubai Police.
6. To examine the effect of benchmarking on the innovation culture of the Dubai Police.
7. To examine the effect of innovation culture on the organisational performance of the Dubai Police.
8. To examine the mediating role of innovation culture in the relationship between Six Sigma and the organisational performance of the Dubai Police.
9. To examine the mediating role of innovation culture in the relationship between Kaizen and the organisational performance of the Dubai Police.
10. To examine the mediating role of innovation culture in the relationship between benchmarking and the organisational performance of the Dubai Police.

## **1.6 Significance of Study**

This research contributes to practical, methodological, theoretical aspects of continuous improvement in the Dubai Police. This study was conducted for many reasons. Firstly, it is important to evaluate the impact of continuous improvement tools

on the performance of the Dubai Police. The Dubai Police face many obstacles and challenges; however, there are no adequate studies and scholarly works in the field of policing. Thus, to offer improvement recommendations to the Dubai Police, a scientific study was needed. Secondly, in the past few years, there was a decline in the performance of the Dubai Police. Therefore, this study proposed a framework to solve this issue. Thirdly, this research could bridge the gap in the literature. In sum, this study is significant in two ways: theory and practice.

### **1.6.1 Theoretical Significance**

This research contributes to the existing knowledge on Six Sigma, Kaizen, benchmarking, innovation culture, and organisational performance with a particular reference to the Dubai Police. Previous studies investigated the effect of Six Sigma, Kaizen, and benchmarking on organisational performance separately. However, the examination of the joint impact of Six Sigma, Kaizen, and benchmarking on organisational performance was not considered. Therefore, the study fills the gap in the Middle East (Albliwi et al., 2017; Farouk et al., 2016) and developing countries like the UAE (Dulaimi & Ellahham, 2016) as well as the gap in the literature.

Another key contribution of this research is a new model that proposes a collective impact of Six Sigma, Kaizen, and benchmarking on organisational performance in an innovation culture. This model has never been considered before. The present research attempted to provide evidence that the highest level of performance could be achieved by combining the improvement tools.

Thirdly, the study further enriches the systems theory and RBV theory that guided this study. The relevance of the systems theory and continuous improvement is that

organisations operate in an open system and could relate with the variables in the environment. On the other hand, the relevance of RBV theory with continuous improvement is that organisations constantly align themselves to the changing environment. From the organisation's perspective, RBV theory concentrates on resources and capabilities for attaining a competitive advantage by adopting and implementing value-added strategies (Prajogo, McDermott, & Goh, 2008), which include Six Sigma, Kaizen, and benchmarking. Moreover, RBV and continuous improvement tools both emphasise efficiency, waste, and customer value (Peteraf & Barney, 2003), and the implementation of such tools assists in enhancing quality and decrease cost, resulting in improved organisational performance.

### **1.6.2 Practical Significance**

The findings of this study are valuable for decision-makers, practitioners as well as managers to improve performance and achieve organisational objectives. The findings can also raise the awareness of the leaders of the Dubai Police concerning its competencies and capabilities to assist in further improvement and development. Besides, this research can guide public organisations or police departments in the UAE or any other country. Even private firms can also take advantage of this study to fulfil their organisational objectives and performance. Finally, this study can be utilised as a foundation to design relevant policies and rules for the UAE government to accelerate the growth, development, and performance of its service entities.

### **1.7 Scope of the Study**

The current study examined the effect of Six Sigma, Kaizen, and benchmarking on organizational performance. As mentioned in the previous parts, studies reported that

the implementation of continuous improvement tools in developing countries is still limited (Dulaimi & Ellahham, 2016; Glover et al., 2014), particularly in the Middle East countries (Albliwi et al., 2017; Farouk et al., 2016), and more specifically in the public sector (Al-Aomar, Aljeneibi, & Almazroui, 2016; Al-Aomar, Al-Mansouri, & Al-Laban, 2017; Alsyouf, Humaid, & Al Kamali, 2014; Alsyouf et al., 2018; Dulaimi & Ellahham, 2016; Jabnoun & Sedrani, 2005; Small, Al Hamouri & Al Hamouri, 2017). As one of the developing countries in the Middle East, the UAE was chosen to study the effect of these tools on the organizational performance of its public organizations. The logical reason for this choice is that the UAE provides an excellent example of a developing country that has achieved rapid growth in using management strategies and providing government services compared with other countries in the Middle East (Rodrigues, Sarabdeen & Balasubramanian, 2016; Suliman, & Al Kathairi, 2012). Furthermore, its public sector is considered a pioneer in the Middle East and Arab region (Al-Ahbabi, Singh, Gaur, & Balasubramanian, 2017; Anadol, Youssef, & Thiruvattal, 2015). However, these tools are not applied in all public sectors authorities in the UAE.

Compared with other government authorities, the Ministry of Interior (MOI) is a pioneer in the UAE (MOI, 2019; SKGEP, 2018) that has applied these tools better than others. The structure of MOI includes seven police agencies they are: Abu Dhabi Police, Dubai Police, Sharjah Police, Ajman Police, Umm Al Quwain Police, Fujairah Police, and Ras Al Khaimah Police. Through research on the applications of continuous improvement tools in these police agencies, it was found that some of these agencies apply benchmarking, and others apply Kaizen but irregularly. None of them have applied these tools in a regular and systematic way.

Moreover, all of these agencies were not familiar with Six Sigma except the Dubai Police. Dubai Police is the only agency in the UAE public sector that applies Six Sigma, Kaizen, and benchmarking maturely and systematically. Therefore, the Dubai Police has been chosen as the scope of the study. Dubai Police is a large police agency with more than 24,000 employees (Abdulla, Djebarni & Mellahi, 2008; Busanad, 2016; Chu, 2017; EFQM, 2018), 32 general departments and police stations and 837 head sections. These units have different tasks and different responsibilities (see Appendix A for more details). All these tasks are in line with the strategy of the government to reinforce safety and security, provide quality services, and prepare to confront various challenges.

In addition, this study employed a quantitative methodology using a questionnaire survey among 837 head sections in the departments and police stations of the Dubai Police. Data were cross-sectional. Head section officers manage the operating core of the Dubai Police, including the implementation of continuous improvement initiatives. They play a mediating role between managers in middle management and employees. Hence, the implementation of continuous improvement projects, business plans, and quality initiatives are their responsibility. Additionally, they know and understand the implementation stages of continuous improvement programs such as Six Sigma, Kaizen, and benchmarking the most in the Dubai Police. Hence, they were the ideal participants.

## **1.8 Operational Definitions of Variables**

An operational definition is “a procedure agreed upon for translation of concept into measurement of some kind” (Deming, 1994, p. 105). It refers to the elements or observed measurable aspects to form an index of measurement of the concept. In other

words, an operational definition is about the details of how the researcher can measure the variable in-depth (Wulandari, 2018). What follows is how the key variables were operationally defined:

**a) Organizational Performance**

Organisational performance refers to the ability of the Dubai Police in meeting the objectives and goals set and providing satisfactory services to the community. Such performance is measured through four main aspects: financial, customer, internal process, and innovation and learning activities.

**b) Six Sigma**

Six Sigma refers to DMAIC phases methodology used to improve processes in order to achieve a group of objectives in the Dubai Police such as productivity, quality, cost reduction, increased clientele, and employee satisfaction etc. Within each phase of the methodology, a set of statistical tools was selected as appropriate. In this study, four distinctive practices fundamental for measuring Six Sigma in the Dubai Police were: the extent of understanding of Six Sigma methodology, the role structure of Six Sigma, the structured improvement procedure, and focus on metrics. These measures focused on: (a) the extent of following standardized processes and procedures in the stage of planning and applying projects; (b) improvement specialists and how the Dubai Police develops them through Six Sigma training; (c) metrics that are employed to quality performance and set improvement objective; and (b) the extent of fully understanding DMAIC methodology.

**c) Kaizen**

It refers to practising Kaizen in the Dubai Police by doing continuous improvement activities to improve the working life of the organisation and its employees. Such activities were measured by six aspects: (a) employees' attitude and their effect on Kaizen activities; (b) the extent to which participants felt they obtained new job skills as a result of being involved in the Kaizen project; (c) perceptions of the need for change in the work area targeted; (d) the role of management to support Kaizen activities; (e) review of Kaizen results; and (f) the extent of accepting changes conducted by Kaizen.

**d) Benchmarking**

Benchmarking refers to the process of improving the Dubai Police performance by continuously planning, searching, analysing, adapting, and evaluating the best practices or processes inside and outside the organisation to gain and maintain an up-to-date understanding of the appropriate performance levels and drivers behind the success. This process was measured by focusing on an internal assessment that highly contributed to the attainment of benefits of benchmarking; the commitment of human resources; and the best practices and following methodological and formal procedures in the benchmarking process.

**e) Innovation Culture**

Innovation culture refers to the shared common beliefs, values, and assumptions of Dubai Police members that could facilitate the process of innovation. This culture can create new ideas, values, and support for organisational activities. It has a role in supporting behaviours that solutions-orientedness, freedom, risk-taking, value creativity, value-seeking, communication, and teamwork.

## **1.9 Organization of the Thesis**

The present study comprises six chapters. The first chapter talks about the study's background, problem statement and gaps, research questions and objectives, the significance of the study, and operational definitions of the key constructs. The second chapter provides a comprehensive literature review on the continuous improvement tools and organisational performance. It also discusses the underpinning theories that support the relationship between Six Sigma, Kaizen, benchmarking, innovation culture, and organisational performance.

The third chapter highlights the conceptual framework of the study and hypotheses. It covers several topics in examining the relationship between continuous improvement tools (Six Sigma, Kaizen, and benchmarking), innovation culture, and organisational performance. The fourth chapter explains the research methodology, which contains sampling and population design, measurement of variables and instruments, procedures of data collection, questionnaire design, pretest, pilot study, and techniques employed in data analysis. The fifth chapter presents the results of the data analysis. Finally, the last chapter discusses the results, particularly the relationship between the constructs, the contribution of the study, limitations and recommendations for future research.

## **1.10 Summary**

The present chapter highlighted the background, problem statement and gaps in the literature, research objectives, and research questions. Subsequently, the theoretical and practical significance of the research and finally the scope of the study were highlighted. The next chapter reviews the relevant literature.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter highlights the associated literature in the fields of organisational performance, Kaizen, Six Sigma, benchmarking, and innovation culture. It discusses the findings of previous studies on the key variables of the study. The results are essential to recognise the contributions of previous studies and identify the shortcomings and gaps in the literature. Also, the comprehensive review of the literature will help develop the hypotheses and establish the conceptual framework and research design.

#### **2.2 Organizational Performance**

Businesses have to perform to succeed (Corvellec, 2018; Ghadge, Kaklamanou, Choudhary, & Bourlakis, 2017). Organisational performance is one of the dependent variables mostly investigated in organisational research even though one of the most complex and loosely outlined constructs (Bergeron, 2017; Gomes & Romão, 2017; Fakhimi, Stergioulas, & Mustafee, 2017; Richard, Devinney, Yip & Johnson, 2009). Many synonyms are used to describe organisational performance such as organisational excellence, accomplishment, success, effectiveness, productivity, output, and efficiency (Aubry & Hobbs, 2011; Miller, 2016). Barney (2001) stated that organisational performance aims to coordinate assets and efforts to work together to achieve the goals of an organisation so that the organisation continues to exist as long as those assets have value.

### **2.2.1 Organizational Performance Definition**

Despite being widely studied, there is no unified definition of organisational performance (Corvellec, 2018; Johannessen, Olaisen, & Olsen, 1999) or appropriate metrics to measure it (Devinney, Richard, Yip, & Johnson, 2005; Richard et al., 2009). Management scholars focus on organisational performance and identify it as a dependent variable to recognise factors that may demonstrate or foresee its variance (March & Sutton, 1997). Studies that had analysed the definition of organisational performance and used it in management research (e.g., Corvellec, 2018; Carton & Hofer, 2006; Venkatraman & Ramanujam, 1987) concluded that performance has different meanings in different fields of study. The definition could be broad or narrow (Meglio & Risberg, 2011). A narrow concept of organisational performance which focuses on financial performance or operational performance is often adapted by strategic management scholars (Carton & Hofer, 2006; Nudurupati, Bititci, Kumar, & Chan, 2011; Venkatraman & Ramanujam, 1987), while organisational scholars usually adopt a broader concept that emphasises organisational effectiveness. Despite the various conceptualisations, there is a lack of conceptualisation in performance research and definition of the construct of performance (Corvellec, 2018; March & Sutton, 1997).

One contributor to the definition of organisational performance is Moullin (2007). Moullin defined organisational performance as the outcome of an organisation and how it meets its customer's expectations. This description of organisational performance is in line with that by Cameron (1981), who considered organisational performance as a "subjective construct anchored in values and preferences of the stakeholders". This definition underscores the notion that the performance of an

organisation can be enhanced by focusing on continuous improvement (Gavrea, Ilies, & Stegerea, 2011). According to Aubry and Hobbs (2011), this definition could be adapted to various organisational situations and provide a potential for recognising several performance evaluation approaches that could exist simultaneously. Such a definition is also coherent with the constructivist view that acknowledges the existence of various competing logics (Aubry & Hobbs, 2011).

### **2.2.2 Measuring the Organizational Performance**

Although organisational performance is considered the most significant principle in evaluating organisations and a key factor for achieving effective management in organisations (Corvellec, 2018; Miller, 2016; Gutierrez, Scavarda, Fiorencio, & Martins, 2015; Pongatichat & Johnston, 2008), there is little consideration to what performance is and what is an appropriate method to measure it (Corvellec, 2018; Richard et al., 2009). Mayne (2017) and Neely, Gregory, and Platts (2005) described a performance measurement system as the collection of metrics utilised to evaluate the effectiveness and efficiency of all activities in the organisation. It helps managers in decision making, planning effectively, and managing and controlling all processes in the organisation (Garengo & Bititci, 2007).

According to Kanji and Moura (2008), measuring performance can help an organisation facilitate the communication between employees, which leads to focusing on the measurement required to achieve performance. They pointed out that the principal objective of performance measurement can be orchestrated to check the progress towards the accomplishment of organisational objectives by recognising improvement opportunities, accomplishing organisational alignment, upgrading responsibility, driving future asset allocation decisions, and communicating with each

other. Despite such benefit, scholars and practitioners face many challenges to finding a suitable and precise approach to measure organisational performance (Devece, Palacios-Marqués, Galindo-Martín, & Llopis-Albert, 2017). This is because of the complicated nature, structure, scale, and scope of organisational performance to understand and therefore measure it effectively (Bergeron, 2017; Devinney et al., 2005). Besides, organisational performance is a multi-dimensional construct, which means that it is important to cover these dimensions to get a consistent measurement (Sondakh, Christiananta, & Ellitan, 2017). Moreover, organisational performance is affected by many factors in the organisation, which represent another obstacle (Devinney et al., 2005). There are also many practical issues regarding which measures should be used (Kaplan & Norton, 1992).

According to Kaplan and Norton (1992), there are different perspectives to measure organisational performance such as financial and non-financial measures and subjective and objective measures. On financial performance, earlier investigations have evaluated several aspects of performance based on profitability, market share, ROI or organisation's growth (Lee, Brownlee, Kim & Lee, 2017b). Another aspect of performance is the non-financial perspective which includes innovation, quality customer, and employee satisfaction. These non-financial measures have been ignored in many studies (Bergeron, 2017; Santos & Brito, 2012), leading to an unrealistic measurement of organisational performance (Sondakh et al., 2017). This is to say that financial performance alone is inadequate to measure the overall organisational performance (Kaplan & Norton, 2005; Lee et al., 2017b; Sondakh et al., 2017). Consequently, combining financial and non-financial aspects of performance will be valuable to efficiently measure and assess organisational performance (Lensink, Mersland, Vu, & Zamore, 2018; Murphy, Trailer, & Hill, 1996; Sondakh et al., 2017).

Given the above, adopting a useful measurement tool to evaluate organisational performance is critical (Madu, Kuei & Jacob, 1996; Sharma & Gadenne, 2002), and traditional measurement which focuses on financial perspective alone is not applicable to present the real status of an organisation's performance (Sondakh et al., 2017). Therefore, a measure that focuses on all areas of the organisation is imperative. This study used a Balanced Scorecard (BSC) as a method to measure the organisational performance of the Dubai Police because it combines both financial and non-financial measures.

### **2.2.3 Balanced Scorecard**

The Balanced Scorecard (BSC) approach was developed by Kaplan and Norton in 1992 to tackle the limitations and obstacles on measures that depend solely on financial gauges. The approach combines both financial and non-financial measures to address problems occurring on measurement systems that rely on historical performance (lagging) (Agyeman, Bonn, & Osei, 2017; Mehralian et al., 2017; Norreklit, Jacobsen, & Mitchell, 2008; Sondakh et al., 2017), which leads to unreal results (Kaplan & Norton, 1992; Sondakh et al., 2017). The BSC approach was also developed to face over-reliance on measures that focus only on the financial items in assessing organisational performance. For that, BSC integrates other perspectives that impact on performance including finance (Kaplan & Norton, 1992). The traditional BSC contains four aspects: finance, customer, internal process, and learning and innovation (Kaplan & Norton, 1992). The financial indicators focus on measures related to financial items such as cost, profitability, and budget. The indicators of customer perspective include the organisation's relationship with its customers, such as customer satisfaction and market share. The indicators of internal business processes are concerned with the

practices, initiatives, and methods employed inside an organisation to generate value and processes improvement. Lastly, the learning and growth indicators focus on creating an appropriate culture for employees to grow and innovate (Mehralian et al. 2017).

The BSC was designed as an answer to concerns regarding on relying on financial measures to assess organisational performance, which leads organisations to emphasise short-term outcomes and depend on lagging indicators to report on the outcomes of the past actions (Kaplan & Norton, 1992; Mackay, 2005). This approach has been accepted and recognised as a framework for strategic management and performance measurement (Aliakbari, Shafiei, & Olfat, 2019; Basu, Little, & Millard, 2009; Bigliardi & Bottani, 2010; Gutierrez et al., 2015). Accordingly, many authors argue that the BSC is considered an appropriate approach to assess organisational performance by balancing financial and non-financial measures (Aliakbari et al., 2019; Kaplan & Norton, 1992; Mehralian et al. 2017; Molina, González, Florencio, & González, 2014). It can also be customised to measure strategy and organisational performance where it works as a continuous improvement technique by allowing organisations including non-profit to effectively measure organisational performance that aligns with the expectations of stakeholders and governance (Soysa, Jayamaha, & Grigg, 2016).

As discussed above, each BSC perspective relies on other perspectives. For that, Kaplan and Norton advocated adopting a balanced model to measure organisational performance as a result of those interrelationships. For instance, service quality is a significant goal for both internal business process and customer perspectives. Although each perspective has different measures of quality, the final objective is the

same. Thus, it would be unattainable to prepare a list of all measures and objectives of all perspectives of BSC of every organisation. This is because each organisation is unique and has a different and unique group of measures and objectives.

The BSC was developed to be flexible and can meet any organisation's requirements. Kaplan and Norton (1992) mentioned that the BSC assists in meeting managerial requirements in two methods. Firstly, it integrates some different elements of an organisation's strategy into a single report and therefore enables the management to get a comprehensive overview of the organisation. Secondly, it focuses on the trade-offs linked with keeping track of specific goals and therefore optimise the managerial actions.

#### **2.2.4 Organizational Performance in the Public Organizations**

Public organisations and particularly governments confront growing pressures to provide relevant services and expectations of the local community (Ammons, 2018; Mayne, 2017), but yet their performance has not reached the level attained by private organisations (De Waal, 2010; Greener, 2019). Public organisations have given less attention to their performance compared to private organisations (Greener, 2019). Additionally, it is not easy to define the performance of public sector organisations due to multi-factors of socio-political imperatives, economic, inputs, outputs and stakeholders' expectations (Ammons, 2018; Mayne, 2017; Parston & Goodman, 2008). De Waal (2010) listed several reasons why the performance of public organisations has been given little attention:

- Understanding performance in public organisations is complicated compared to the performance of private organisations.

- Governments do not seek to accomplish profit. Thus, their employees are not motivated for high performance.
- Hierarchy and structure in government are complicated and are affected by many factors; hence, the change process is not easy.

These obstacles represent a substantial challenge to achieve great performance in public organisations (Ammons, 2018; Mayne, 2017; O’Flynn, 2007). Serrano, Molinero, and Bossi (2003) indicated that public and private organisations do not have similar performance measures based on their objectives and core business. While the core objective of public organisations is to meet the needs of a citizen within a specific budget (Junita, Erlina, & Abdullah, 2018; Kearney, 2018), private organisations focus on profit and return on investment within a large budget (Serrano et al., 2003).

Private sector organisations outperform public sector organisations when it comes to quality management practices, particularly in process management, which seems to be easier for the former (Eriksson, 2016). Mulgan (2012) pointed out that performance in government refers to the application of particular policies and to what extent they are successful in fulfilling the goals set. O’Toole and Meier (2011, p. 79) defined the performance of public organisations as “the achievements of public programmes and organisations regarding the outputs and outcomes that they produce.” In other words, the primary purpose of the public performance is to ensure that resources have been employed purposefully to accomplish efficiency, effectiveness, and fairness (Brewer & Selden, 2000; Halachmi, 2002; Vermeeren, 2015). Indeed, the performance term in public management is most commonly related to themes of efficient and effective administration of government policies (Adejuwon, 2014). The aim of performance

management in the public sector is to clarify all budget, resources, and assets according to the agreed terms (De Waal, 2010; Van Dooren et al., 2015), and convey the outcomes of decision-making. Therefore, the accepted performance achieved in public organisations is related to performance management in accordance with government policies (De Waal, 2010).

Due to the difficulties in measuring organisational performance in public organisations, Brewer and Selden (2000) proposed to use measurements that focus on the perceptions of the organisation's employees. Kim (2005) argued that objective data is more applicable because it could be less biased, but the problem with these data lies in the lack of availability especially in the public sector. Therefore, in this case, subjective measures would be a sensible alternative (Allen & Helms, 2002; McCracken, McIlwain, & Fottler, 2001; Schmid, 2002). Although these measures have invited some criticisms, there is evidence that subjective and objectives measures are interconnected at the organisational level. For example, Dess and Robinson (1984) indicated that the linkage between subjective data and financial measures is positive. Similarly, McCracken et al. (2001) and Powell (1992) found a positive relationship between perceived measures and objectives measures of organisational performance.

Nevertheless, there is no agreement about the stringent and comprehensive criteria to measure organisational performance (Forbes, 1998) because focusing on one side of performance will lead to producing misleading results (Brewer & Selden 2000). Consequently, Kaplan and Norton (1992) demonstrated that focusing on one perspective alone is not efficient in measuring the organisation's performance in a competitive business environment. Hence, they introduced Balanced Scorecard (BSC) as a management tool to measure the performance of all types of organisation by using

all organisational elements including financial and non-financial measures that can be used in both public and private organisations (Kaplan & Norton, 1992).

### **2.2.5 Measuring Performance in Policing**

It is widely recognised that police organisations around the world are steered, monitored and evaluated through a set of different indicators relating to three main areas: political and societal pressures to decrease and prevent crimes and deliver economies; technological change facilitating the retrieval of data relating to performance, and neo-managerial thinking favoring the detailed measurement of performance (De Maillard & Savage, 2017). Accordingly, some writings mentioned the consequences of management and performance measurement in police agencies, particularly the effect of focusing on quantitative indicators and targets on decision-making and actions of police agencies. In this regard, De Maillard and Savage (2017) identified four types of negative consequences related to these quantitative measures. Firstly, police agencies become overly concentrated on measurable activities such as criminal detections while ignoring other activities that have no direct, measurable outcomes although they are socially beneficial (Cockcroft & Beatie, 2009; De Maillard & Savage, 2012). Secondly, focus on standardised indicators lead to enhanced centralisation (FitzGerald, Joseph, Qureshi, & Hough, 2013; De Maillard & Savage, 2012; Sparrow, 2015). Thirdly, such measure increases the divide between frontline officers and managers (FitzGerald et al., 2013). Fourthly, it increases the pressure to perform, which results in ‘juggling’ practices to achieve performance (Sparrow, 2015).

Relatedly, Gorby (2013) indicated that academic researchers have failed to find appropriate metrics for police agencies. Some argued that output measures such as clearance rates, response times, crime rates, etc. are too narrow (Davis, Ortiz, Euler,

& Kuykendall, 2015; Gorby, 2013; Sparrow, 2015) because these metrics pay little attention to the actual outcomes of police activity (Barrett & Greene, 2015). Others have criticised the traditional police indicators because of several unwanted consequences such as falsifying data and human rights abuses (Eterno & Silverman, 2012; Kwak, Dierenfeldt, & McNeeley, 2019; Patrick, 2011). As a result of the criticisms of such traditional indicators, several alternative strategies have been proposed (Barlage, Van den Born, Van Witteloostuijn, & Graham, 2014; Coldren, Huntoon, & Medaris, 2013; Guilfoyle, 2015; Rosenbaum, Lawrence, Hartnett, McDevitt, & Posick 2015). Some suggested a comprehensive system that covers all police measures (Coldren et al., 2013; Maillard & Savage, 2017). Some called for the employment of more sophisticated metrics (Guilfoyle, 2015) while others proposed using qualitative indicators (Fielding & Innes, 2006; Shilston, 2011).

A central topic in the literature is that policing indicators should take into account of efficiency and effectiveness (Legrand & Bronitt, 2012; Najafi, Aryanegad, Lotfi, & Ebnerasould, 2009) including the views, needs, and expectations of stakeholders (Davis et al., 2015; Kiedrowski, Petrunik, Macdonald, & Melchers, 2014; Rosenbaum et al., 2015). According to Legrand and Bronitt (2012), the objectives of police agencies are to boost the rule of law and protect human rights. To achieve these goals, the police have to continuously participate in a series of legislative manoeuvres to fulfil the social, economic, technological, demographic and political demands. Efficiency and effectiveness become necessary to measure the performance of such organisations (Legrand & Bronitt, 2012). As a result of these criticisms, a broader range of performance indicators that focus on efficiency and effectiveness of processes, outcomes, and quality has been developed (Neyroud, 2008). Governments have widely accepted efficiency and effectiveness because such measures provide some metrics of

the worth or even load to the public budget as well as these metrics are considered a test of success strategies of the police (Legrand & Bronitt, 2012; Najafi et al., 2009). Accordingly, many advocates adopt the BSC as a model to measure organisational performance in police agencies. The BSC can cover and measure all of these aspects by accomplishing strategic goals (effectiveness goal) and enhancing the use of resources in creating preferred outputs (efficiency goal) as well as obtaining balance and cause and effect in its perspectives (Najafi et al., 2009).

### **2.2.6 The Performance Measurement Used in This Study**

As mentioned previously, financial performance is the key indicator to measure the performance of private organisations. However, public organisations have different goals because they do not exist to make a profit (De Waal, 2010). Therefore, financial performance does not have the same importance in public organisations.

A most common measure of organisational performance that covers all aspects of the organisation is the BSC (Aliakbari et al., 2019; Cooper, Ezzamel, & Qu, 2017; Kaplan & Norton, 1992; Rigby & Bilodeau, 2015). This measure has been employed by several studies that endeavored to gauge the performance of public organisations (Aliakbari et al., 2019; Gurd & Gao, 2007; Julyan, 2011; Karra & Papadopoulos, 2005; Mafini & Poee, 2013; Messeghem, Bakkali, Sammut, & Swalhi, 2017; Nayeri & Rostami, 2016; Pienaar & Penzhorn, 2000). It has also been employed in the field of continuous improvement such as Six Sigma (Habidin, 2012; Habidin & Yusof, 2012; Habidin, Yusof, & Fuzi, 2016; Khaidir, Habidin, Ali, Shazali, & Jamaluddin, 2013), Kaizen (Iselin, Sands & Mia, 2009), and benchmarking (Al-Dhaafri et al., 2016a; Mehralian et al., 2017). Therefore, this research applied the BSC perspectives to evaluate the performance of the Dubai Police.

### 2.3 Overview of Continuous Improvement

The service industry has experienced a considerable change in the last decades involving significant changes in management systems, expectations, and attitudes of customers (Ahuja & Khamba, 2008; Huang, Lee, & Chen, 2017). As a result, it needs to adopt practical approaches such as continuous improvement methods to achieve the required results (Singh & Singh, 2012). The origins of continuous improvement approaches are based on quality principles (Brown & Eatock, 2008; McLean, Antony, & Dahlgaard, 2017) and can be simply defined as a process of incremental improvement initiatives that focus on increasing successes and reducing failures (Bessant & Caffyn, 1997; Bhuiyan & Baghel, 2005). The principle of continuous improvement supposes that numerous little and incremental changes can collectively lead to significant and rooted improvements over time (Cohen, Plecas, Begley, & Burk, 2015). Put differently, the continuous improvement relies on a notion that an organisation can always improve and increase the performance level.

The concept of continuous improvement has attracted many practitioners to employ its tools as a result of considerable success achieved in many organisations. Scholars and practitioners have different views of a continuous improvement approach. Deming was the first scholar who adopted the continuous improvement concept by its famous cycle called PDCA (Prajogo, 2004). According to Anand, Ward, Tatikonda, and Schilling (2009), continuous improvement is an organised effort that aims to apply new approaches to doing work to achieve the desired improvements. It is a dynamic capability of collective activity that organisations can use to modify their work in pursuit of improved effectiveness (Furlan & Vinelli, 2018) by focusing and sustaining incremental improvements (Prajogo, 2004). Bhuiyan and Baghel (2005) defined

continuous improvement as a culture of continued enhancements of all levels in an organisation. In other words, continuous improvement is “a systematic approach to the measurement, analysis, and improvement of business processes to identify critical areas that can produce breakthrough results in market penetration, product quality attributes, quality assurance and/or manufacturing processes, customer satisfaction, cycle time and/or the cost of doing business” (Scott et al., 2009, p. 209).

In brief, Deming described continuous improvement as a philosophy containing improvement programmes that enhance success and address issues (Juergensen, 2000). It is a culture of sustained improvement aiming to eliminate wastes in all organisation’s processes and systems (Bhuiyan & Baghel, 2005). Thus, it can be said that continuous improvement tools can effectively help organisations to improve performance, resource allocation, enhance commitment, and attain competitive advantage (Antony et al., 2005; Mann, Adebajo, & Kehoe, 1998; Miller, 2001).

### **2.3.1 Benefits of Implementing Continuous Improvement Tools**

The implementation of continuous improvement tools helps organisations to adopt a learning process and problem-solving approaches (Struckman & Yammarino, 2003) and drive organisations to adopt new, more efficient approaches to enhance workforce learning (LeBrasseur, Whissell & Ojha, 2002). According to Singh and Singh (2015), continuous improvement tools assist in improving operations of an organisation in numerous facets. However, these tools are not necessarily efficient at resolving all issues. Therefore, to overcome the disadvantages of one tool or another, different tools must be employed (Singh & Singh, 2015). Six Sigma, Kaizen, and benchmarking are the most popular continuous improvement tools used in many organisations (Bhuiyan & Baghel, 2005; Douglas, Douglas, & Ochieng, 2015; Hamrol, 2018; Rashid &

Ahmad, 2013; Singh & Singh, 2015). Numerous investigations deduced that these tools contribute to minimise inventory waste by 80 per cent and reduce manufacturing cycle times and labour by 50 per cent (Pirraglia, Saloni, & Vand Dyk, 2009). They have also a role in improving production quality (Kumar & Sosnoski, 2009), increasing market capitalisation and higher efficiency (Vakhariya & Rao, 2009), growing customer satisfaction (Swinehart & Smith, 2005; Zhu, Johnson & Sarkis, 2018), improving people and business performance (Sraun & Singh, 2017), and reinforcing the organisational culture (Eriksson & Garvare, 2005).

### **2.3.2 Continuous Improvement Tools Used in This Study**

Over the decades, continuous improvement tools have been developed to enhance organisational performance, reduce waste and defects, and improve quality. Continuous improvement tools have been mentioned under several titles. In some cases, they are called quality approaches (Marash, Berman, & Flynn, 2004), continuous quality improvement (Hunt, Hunter, & Levan, 2017), quality tools (Marash et al., 2004), business process improvement methodologies (Bendell, 2005), management techniques (Staw & Epstein, 2000), business and management ideas (Greatbatch & Clark, 2005) or management tools (Rigby & Bilodeau, 2015).

Hayes, Pisano, Upton, and Wheelwright (2005) divided continuous improvement tools based on their nature into two types: incremental improvements and breakthrough improvements. Incremental improvements seek to accomplish changes in the infrastructure of an organisation such as systems, people, and culture while breakthrough improvements are concentrated to do significant structural changes. As well, Shankar (2010) divided continuous improvement tools into three groups: the first group is tools designed to increase efficiency and maximise the use of resources such

as Theory of Constraints and Lean tools. The second group is tools aim to solve a problem and achieve continuous improvements such as DMAIC and PDCA. The third group seeks to conduct significant improvement in product, process or current way of thinking such as benchmarking, TRIZ, and DMADV.

According to Yusof and Aspinwall (2000), many of these tools tend to be strict and complicated. Therefore, Kaizen and Six Sigma are useful and best-known tools that can be used (Bhuiyan & Baghel, 2005; Botlhale, 2017; Sodhi et al., 2019; Sraun & Singh, 2017). Similarly, Antony et al. (2005), Blanchard (2006), and Higgins (2006) identified Six Sigma, Lean, HACCP, and dashboard metrics as primary continuous improvement methodology that enables organisations to modify the way they perform their business processes to react to shift occurred in both social and economic circumstances.

Rashid and Ahmad (2013) identified eight leading methodologies in the field of continuous improvement including Six Sigma, Kaizen, and benchmarking. These tools assist organisations in conducting the required changes in their business processes based on the requirements of both social and economic environment (Radnor, 2010). According to Baczewski (2005), Nave (2002), and Radnor (2010), Six Sigma, Kaizen, and benchmarking have different ways of improvement. Table 2.1 shows the differences and the main focus of these tools. Although they work differently, they all focus on improving the business process, meeting customer requirements, and reducing defect.

Table 2.1  
*Differences Between Six Sigma, Kaizen, and Benchmarking*

Tool	Description	Key focus
Six Sigma	“A structured approach to data-driven problem-solving”.	Process
		Customer
		Defect reduction
Kaizen	“An approach to continuous incremental improvement, creating more value and less waste.”	Process
		Customer
		Waste reduction
Benchmarking	“A comparison with external organisations to highlight and develop best practices.”	Process
		Customer
		Waste reduction
		Defect reduction

Source: Radnor (2010, p. 177), Baczewski (2005), and Nave (2002)

Overall, reviewing the literature revealed that these tools had been employed successfully in both private and public organisations (Sodhi et al., 2019). In this study, Six Sigma, Kaizen, and benchmarking were employed to examine their effect on the performance of the Dubai Police because they are the most valuable business-improvement techniques available today to improve organisational performance (Bhuiyan & Baghel, 2005; Botlhale, 2017; Carmona-Márquez, Leal-Millán, Vázquez-Sánchez, Leal-Rodríguez, & Eldridge, 2016; Sharma, 2013; Spector, 2006).

## 2.4 Six Sigma

In the pursuit to achieve higher organisational performance and operational effectiveness, researchers and practitioners are looking for an effective method for improvements that contribute toward the attainment of competitive advantage, increased profitability, and improved overall performance (Gumusluoglu & Ilsev,

2009; Smętkowska & Mrugalska, 2018). The Six Sigma approach is a modern model of excellence (Sunder & Antony, 2018). It has gained significant attention and acceptance in various sectors as a framework for continuous improvement (Callahan & Roberts, 2017; Sunder & Antony, 2018), which can allow an organisation to calibrate its processes and performance based on the level of sigma (Meyer, Maehling, Varghese, & Lewis, 2017; Goh & Xie, 2004; Rimantho, Rahman, & Cahyadi, 2017). Six Sigma is a quality improvement technique that has traditionally been concentrated on improving quality and decreasing defects (Sperl, Ptacek, & Trewn, 2013). It is a long-term approach that assists leaders in changing their organisation (Camgoz-Akdag, 2007; Pyzdek & Keller, 2014). The literature considers Six Sigma as one of the most crucial continuous improvement tools which contains a set of statistical tools that assist an organisation to improve and measure the achieved results (Laureani & Antony, 2018), enrich their performance (Hwang et al., 2017), improve efficiency and effectiveness (Kumaravadivel & Natarajan, 2013), and enhance value for customers and providers (Antony et al., 2017ab).

#### **2.4.1 The Origin of Six Sigma**

Six Sigma was initiated in Motorola Corporation in the 1980s, after which this approach had grown in popularity, and many organisations have adopted it to achieve success (Ridwan & Noche, 2018; Snee & Hoerl, 2018). Six Sigma is an inclusive, focused, and adaptable system that can assist an organisation in maximising its business success (Pyzdek & Keller, 2014; Rao, 2018), and accomplish improvements in the business process in all organisations (Hayler & Nichols, 2007). According to Yousfi, de Freitas, Dey, and Saidi (2016), Six Sigma is a rigorous approach to principles-based continuous improvement techniques, methods, and statistics tools. It

has developed to overcome the disadvantages of total quality management (TQM) as being a fuzzy and less visible concept with unclear goals (Khandekar & Sulakhe, 2014). Therefore, it is considered a "rebirth" of the quality movement that can handle all the shortcomings (Khandekar & Sulakhe, 2014; Swain, Cao, & Gardner, 2018). Moreover, Ridwan and Noche (2018) considered Six Sigma a breakthrough in TQM. It provides new and distinct practices and concepts to address the variability in the processes aiming to minimise the defect and diminish the cost of poor quality (Ridwan & Noche, 2018) through a unique organisational structure by sharing new techniques and tools with traditional quality management methods (Schroeder et al., 2008).

#### **2.4.2 Six Sigma Definition**

The symbol  $\sigma$  is a Greek letter called "Sigma" used to describe variability in a process while "Six" refers to six standard deviations from the arithmetic mean. In the methodology of Six Sigma, defects per unit are employed as a measurement of sigma level. Therefore, a higher value of sigma refers to a lower level of defects while a smaller value of sigma translates to a higher number of defects. A Six Sigma value refers to 3.4 defects per million opportunities (Harry, 1998; Ridwan & Noche, 2018). The literature has provided several definitions of Six Sigma which have been expressed in different ways. This is because of the difficulty of defining this term in a straightforward sentence (Raisinghani, Ette, Pierce, Cannon, & Daripaly, 2005) and the various points of view of practitioners (Schroeder et al., 2008); hence, developing a formal conceptual definition of Six Sigma is almost unattainable because this definition is impacted by the changing nature of an organisation's needs (Zhang, Irfan, Khattak, Zhu & Hassan, 2012). One of Six Sigma definition was offered by Hammer (2002), who defined it as a methodology based on projects, aimed to solve particular

problems in an organisation's processes. It is a systematic and organised approach that relies on statistical and scientific tools to improve a strategic process and develop products and services to reduce the defects of units (Linderman, Schroeder, Zaheer, & Choo, 2003). Bremer, McKibben, and McCarty (2006) defined Six Sigma as a measurement tool that helps manage continuous improvement programmes, process variation, and KPIs. Schroeder et al. (2008) argued that all of these definitions are very general and do not cover all Six Sigma aspects; therefore, they defined it “as an organized, parallel-mesostructure to reduce variation in organisational processes by using improvement specialists, a structured method and performance metrics with the aim of achieving strategic objectives” (Schroeder et al., 2008, p. 540).

### **2.4.3 Six Sigma Techniques**

Six Sigma techniques are initiated with the MAIC cycle. This cycle refers to the acronym of measure, analyse, improve, and control (Folaron, Morgan, & Co, 2003; Smetkowska & Mrugalska, 2018). Later, many efforts have been made to strengthen the Six Sigma elements to be more efficient (Schroeder et al., 2008; Zu et al., 2008). Thus, the cycle has been modified to include five stages by adding “define”; hence, the new cycle becomes DMAIC. The DMAIC model provides a guide for conducting improvements in an organisation’s processes (Antony & Banuelas, 2002; de Koning & de Mast, 2006; Goh & Xie, 2004; Linderman et al., 2003; Mishra & Sharma, 2014; Sekhar & Mahanti, 2006). DMAIC is a routine tool for designing new methods or changing the current routines (Schroeder et al., 2008). It is a tool for variation reduction and as an approach to apply continuous improvement and solving problems (Ruben, Vinodh, & Asokan, 2018).

As mentioned above, the model of DMAIC contains five phases: define, measure, analyse, improve, and control. Each phase contains several tools and techniques. A team of black belts, green belts, and yellow belts employ these tools and techniques to improve the project. Additionally, some indicate that Six Sigma has two methodologies: DMAIC and DMADV (Define, Measure, Analyse, Design, and Verify). While DMADV can be used for designing new processes or systems, DMAIC is employed for existing processes or systems (Harrington, Gupta, & Voeh, 2009). However, DMAIC is still a preferred approach to implement the Six Sigma methodology (De Koning & de Mast, 2006; Smętkowska & Mrugalska, 2018).

#### **2.4.4 DMAIC Steps**

As mentioned previously, the DMAIC model contains five phases. The first phase "define" is focused on identifying DMAIC stages, assessing problems, and determining expected benefits that will enhance value for customers and the business (Goh & Xie, 2004; Lu, Laux, & Antony, 2017). The Six Sigma project should be identified based on the objectives of the business or to meet some customer needs (Antony, Krishan, Cullen, & Kumar, 2012; Henderson & Evans, 2000; Lu et al., 2017). The project team is responsible for determining critical-to-quality characteristics that meet customer expectations.

The second phase "measure" is aimed at translating the problem identified in the first phase into a weighable template and measuring the current circumstance (De Koning & De Mast, 2006; Lu et al., 2017). In this stage, the project team determines the vital process that impacts on quality and measures the defects related to these methods (Henderson & Evans, 2000).

In the third stage “analyse”, the interconnection between the variables of the primary process and the origin causes of defective points is identified (Goh & Xie, 2004; Lu et al., 2017). This stage includes discovering and determining the causes for generating defects, identifying the capability of the baseline process, and implementing corrective actions (De Koning & De Mast, 2006). In the fourth stage “improve”, the influence and acceptable limits of the key process variables of the process are quantified and determined to reduce the defect scale by designing and adjusting the process to achieve the required improvements (De Koning & De Mast, 2006; Goh & Xie, 2004; Lu et al., 2017). This phase is necessary to confirm the critical variables and identifies their impacts on the quality, determines an acceptable level of these variables, adopts the measurement system to detect deviations of the variables and adjust the process by the acceptable level (Henderson & Evans, 2000). The last stage “control” aims to maintain a required level of performance and sustain the continuity in short and long-term by adjusting the control system and process management to accomplish desirable improvements (Goh & Xie, 2004).

#### **2.4.5 Statistical Tools of Six Sigma**

A sigma level is calculated by measuring the number of standard deviations between the mean of a particular process and corresponding specification limit in sigma units using a process capability index. This index measures the process capability by calculating the ability of a process to make output based on the required specification.

Six Sigma provides tools that aim to reduce defects or erroneous rate in a process and simultaneously introduce a systematic approach for assessing organisational performance (Lehnert, Linhart, & Röglinger, 2016; Ridwan & Noche, 2018; Sawalakhe, Deshmukh & Lakhe, 2016). Some of these tools are more advanced than

the others. Hence, the level of the businesses process improvement identifies the right tool to be employed (Antony & Banuelas, 2002) as well as possessing the analytical background and using statistical analysis software (Breyfogle, Cupello, & Meadows. 2001). According to Henderson and Evans (2000), the project team should identify each tool and how to exploit it to achieve the required goal. This is because misusing one of these tools will negatively impact on the success of the project (Pande et al., 2000). The purpose of these tools is to assist in determining potential problems in order to resolve it by taking a number of actions (Pande et al., 2000).

Pande et al. (2000) reviewed groups of Six Sigma tools that can be employed to test statistical significance such as ANOVA, T-test, and Chi-Square. These tools help define and analyse the root causes of problems and therefore assist in getting valid conclusions (Pande et al., 2000). The other analysis group is correlation and regression tools, which aim to analyse the relationships between two or more elements. The correlation tool is used to measure the relationship and strength of this link by using statistical calculations. This analysis is conducted to get many results of this relationship and assist in examining the root-cause hypotheses by exploring an association between the potential causes and the response or output. Regression analysis helps measure and compare the impact of several factors on the results and predict the level of performance of processes, services or products under certain conditions.

Another tool named the Design of Experiments tool aims to investigate and improve the performance of a process by employing a set of tools that have just been rigorously reviewed to understand the behaviour of a process under certain conditions (Goh, 2002). The Design of Experiments tool helps the project of Six Sigma by assessing the

requirements of customer systems to explore the appropriate combination of methods that assist in improving this system. Also, this tool helps isolate defects and problem causes by assessing factors and choosing possible solutions. Another statistical tool called the Failure Modes, and Effects Analysis (FMEA) aims to determine and prioritise the likely failures or problems. It also assists project team, process owner or manager to concentrate, exploit and monitor resources (Sokovic, Pavletic & Fakin, 2005).

In summary, a set of critical statistical and analytical tools that could be employed to achieve success in each stage of DMAIC cycle and therefore the success of the project (Pande, Neuman & Cavanagh, 2002) has been elaborated. These tools represent a scientific method that could be used to achieve improvements in processes, products, and services.

#### **2.4.6 Six Sigma Belt System**

Organisations depend on people and their knowledge to improve their performance; thus, the success of continuous improvement tools including Six Sigma relies upon individuals being correctly prepared (Harry, 1998). These people have been identified as either improvement professionals (Linderman et al., 2003), specialists, or experts with particular responsibilities and tasks (Henderson & Evans, 2000). Further, a specific profile set of people is structured and deployed in the organisation's system under the name of Six Sigma belt system (Ingle & Roe, 2001). In the belt system, jobs of individuals are distinguished and classified according to their tasks and responsibilities in the project. Hence, Six Sigma is a top-down approach where these groups are arranged in a hierarchical structure system (Buch & Tolentino, 2006). This

system involves Champion, Master Black Belts, Black Belts, Green Belts, and Yellow Belts (Goh & Xie, 2004; Henderson & Evans, 2000; Savolainen & Haikonen, 2007).

#### **2.4.7 Six Sigma Implementation in the Public Sector**

Public organisations including government agencies play an important role in improving the progress of economic and social environment of any country. Delivery of services for customers is the central pillar of these organisations; therefore, it is critical to assure the quality of these services to meet the needs and expectations of the customers. Thus, Six Sigma is a strategy for continuous improvement that assists in improving efficiency and effectiveness of the organisation's processes that deal with their customers (Antony & Banuelas, 2002; Kumaravadivel & Natarajan, 2013).

Many studies have shown that Six Sigma is not only assisting organisations to improve their efficiencies and satisfaction of customers, but is also helping them to increase profits and decrease operating costs (Cheng, 2017; Gowen & Tallon, 2005; Harry, Mann, Hodgins, Hulbert, & Lacke, 2010; Laureani, Brady & Antony, 2013), and the quality of services (Johanudin, Khairil, Noorsa, Muhammad, & Noraslinda, 2017). It is considered a process improvement technique that significantly contributes to improving performance capability of the process and creating bottom-line results for organisations (Desai & Prajapati, 2017; Improta, Cesarelli, Montuori, Santillo, & Triassi, 2018; Linderman et al., 2003; Randell et al., 2018).

Many authors contend that Six Sigma has been developed to be utilised in manufacturing organisations (Johanudin et al., 2017; Mehrjerdi, 2011; Pande et al. 2000; Snee & Hoerl, 2003). Therefore, most studies have focused on Six Sigma in these organisations (Chiarini, 2013). The literature also shows that the majority of Six

Sigma applications have been done in the manufacturing organisations and mostly in larger companies. Nevertheless, several experts indicate that it could also be employed in non-manufacturing sectors such as education institutions, customer services, software development, and administrative functions (Akpolat, 2017; Bossert & Grayson, 2002).

The successful implementation of Six Sigma in the manufacturing industry has inspired the service industry to get its benefits (Antony, 2004a). Several publications have indicated the successful implementation of Six Sigma in the service sector (Alsyouf, Kumar, Al-Ashi, & Al-Hammadi, 2018; Breyfogle et al., 2001; George & George, 2003; Hernandez, 2017; Kwak & Anbari, 2006; Shamsuzzaman, Alzeraif, Alsyouf, & Khoo, 2018). However, most service processes are still operating at between 1.5 and 3.0 sigma levels (Pande et al., 2000; Yilmaz & Chatterjee, 2000) because improvement initiatives of services organisations have been primarily ignored (Does, Van den Heuvel, De Mast, & Bisgaard, 2002), and many obstacles and challenges have handicapped its implementation in this sector (Antony, 2004b; Bhat, Gijo, & Jnanesh, 2014; Gijo, Antony, Hernandez & Scaria, 2013). Additionally, there are difficulties to develop measurable processes and direct quality measures where service activities are not defined terms of quantifiable processes (Prashar, 2016).

Some scholars argue that there is no association between Six Sigma and government organisations and their processes. This is because the goal of government agencies is to provide services to the public community and in general, they are not seeking to cut cost to realise efficiencies, whereas financial savings are the aim of Six Sigma (Antony et al., 2016a). However, Chiarini (2013) asserted that Six Sigma could be applied effectively in service organisations by shifting the focus of Six Sigma to concentrate

on making added value to customers (Antony et al., 2017c). Also, Ozcelik (2010) emphasised that Six Sigma can efficiently employ for service industries and can be used to cover more general tasks like improving quality and efficiency, improving operations management, and reducing cost and beyond manufacturing to include services (De Mast & Lokkerbol, 2012). Antony (2004a) also highlighted the benefits of using Six Sigma methodology in service organisations, such as improved cross-functional teamwork; the transformation from reaction mode to work with a proactive style; improved morale of employees; faster delivery of services as a result of decreasing or eliminating the number of non-value added steps; reduced cost of poor quality; increased knowledge of problem-solving methods which positively impact on employees' job satisfaction; diminished processes variability, improving the rate of service consistency; and provision of efficient data and facts, helping the decision-making process.

The literature shows some success stories of implementing Six Sigma in government agencies. For example, the Dubai Police employed Six Sigma methodology to reduce the time to issue criminal reports from 96 days to a mere 7 hours (Antony et al., 2016a). Another success story in city councils in the UK which employed Six Sigma that resulted in eliminating non-value-added steps by 20%, reducing about 30% of the error rate of the process, and reducing 30% in variation in scanning times (Antony, Setijono, & Dahlgaard, 2016b).

The application of Six Sigma in the UAE's public sector is still immature (Al-Aomar, Aljeneibi, & Almazroui, 2016; Al-Aomar, Al-Mansouri, & Al-Laban, 2017; Alsyouf, Humaid, & Al Kamali, 2014; Alsyouf et al., 2018). The majority of applications are in the private sector such as food and beverage industries (Al-Aomar, Al-Saberi, Al-

Ameri, Al-Wahedi, & Eke, 2017), engineering (Shahada & Alsyouf, 2012), and education (Dhariwal & Bhagchandani, 2013; Navas, Akash, Sathish & Azharudeen, 2016). Therefore, further research needs to be carried out to investigate the impact on the public sector.

#### **2.4.8 Six Sigma in Police Agencies**

An effective and legitimate police service represents a fundamental cornerstone of a developed nation (Barton & Matthews, 2017). However, such services need to move towards greater levels of efficiency (Radnor & Osborne, 2013). In achieving reform, attention has been directed towards the implementation of proven continuous improvement methodologies (Barton & Matthews, 2015).

According to Antony et al. (2017b), police organisations can adopt Six Sigma to achieve effective and efficient processes to deliver value for customer experience at reduced operational costs. Nevertheless, there is inadequate evidence of the implementation of Six Sigma in such agencies (Antony et al., 2017b; Barton, 2013b). For instance, Barton (2013a) investigated the impact of Six Sigma in five police agencies in the UK. He found that using Six Sigma in these agencies was a temporary tool to achieve certain results only. Similarly, in the United States, the use of Six Sigma in police agencies is still relatively recent (Doss, 2014). Police agencies that have implemented Six Sigma include Ventura Police Department, the Monroe County Sheriff's Department, Arizona Police Department, and Mesa Police Department (Doss, 2014). According to Scarborough (2007), the implementation of Six Sigma in the Mesa Police Department led to improved efficiency and effectiveness of law enforcement capacity to render public service and savings about USD326,950 and reducing the time to process the booking used to incarcerate prisoners from two hours

to 10 minutes. Another example of the successful implementation of Six Sigma was Broward County Sheriff's Department where it helped increase the productivity of employees and decreasing the operational costs (Fletcher, 2010). Six Sigma was also implemented at Monroe County Sheriff's Department that contributed to reducing the cycle time of operations affiliated with reporting (Doss, 2014). At Ventura Police Department, Six Sigma implementation reduced the time of investigations and time of records and information processing cycle from 97 hours to 34.4 hours (Doss, 2014). Richard and Kupferschmid (2011) stated that implementing Six Sigma at Louisiana State Police Crime Laboratory increased the completion rate of DNA requests to 131 per cent.

Despite these success stories, however, there is not much initiative to use Six Sigma to improve the processes among police agencies. If any, these initiatives lack maturity (Doss, 2014), and there is a limited empirical investigation on Six Sigma implementation in this field (Patyal & Maddulety, 2015).

#### **2.4.9 Six Sigma in the Dubai Police**

The Dubai Police employ the DMAIC methodology to conduct Six Sigma projects that aim to solve a given problem to contribute to an organisation's business goals. Managing Six Sigma projects requires selecting team members, identifying their roles and responsibilities, and training them to recognise the DMAIC processes and statistical systems so that the projects could be implemented correctly.

### 2.4.9.1 Six Sigma Personnel and Their Roles in the Dubai Police

Conducting Six Sigma projects requires identifying the role of each member of the team. The hierarchy of implementation in the Dubai Police is divided into three levels. The leadership level includes Improvements Steering Committee, Director of Six Sigma Centre for Continuous Improvement (SSCCI), Six Sigma Champion, and Project Sponsor. The supervisory level involves master black belt and black belt members. The executing level includes green and yellow belt members. A schematic representation of the interrelationships is displayed in Figure 2.1.

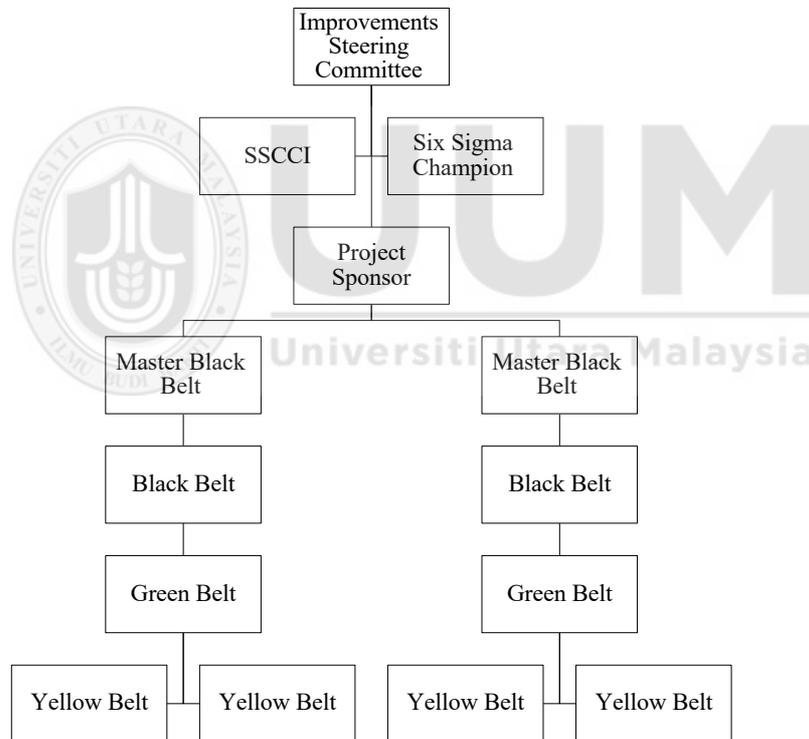


Figure 2.1  
*Six Sigma Roles and Their Interrelationships in the Dubai Police*

#### i) Improvements Steering Committee

Improvements Steering Committee is the top level of this hierarchy that is responsible for recognising the priorities and acquiring an approval on projects..

## **ii) Champion**

Champion in the Dubai Police should be one of assistants commander, who is responsible for determining the strategy for the deployment of Six Sigma throughout the department and accountable for setting and promoting business objectives with regards to the Six Sigma initiative.

## **iii) Director of Six Sigma Centre for Continuous Improvement (SSCCI)**

SSCCI is responsible for supervising and managing the deployment of Six Sigma in the Dubai Police. The director roles are: (1) promoting projects of Six Sigma, (2) identifying, along with senior management, the projects of Six Sigma and the nature of the expansion within the Dubai Police, (3) preparing reports about projects to senior management, (4) recruiting candidates of master black belts and black belt for the purpose of projects, and (5) seeking potential projects and participating in reviewing projects.

## **iv) Project Sponsor**

The project sponsor is vitally essential to the successful outcome of a Six Sigma project in the Dubai Police. This person is the process owner within which a Six Sigma project is to be engaged. The project sponsor's roles are connected to (1) the success of the project, (2) the importance and efficient use of gate reviews, (3) the institutionalisation of any problem solution, (4) the elimination of old methods of doing business after a new answer is in-place, and (5) the satisfaction of any training wants.

The principal tasks of the project sponsor are: (1) to champion the Six Sigma methodology with peers and with others higher in the organisation; (2) to help the

proposed Six Sigma project; (3) to grant resources requested by the black belt required for the Six Sigma project; (4) to exclude any handicaps encountered by the black belt in discharging the project; (5) to participate in all gate reviews directly and to sign-off on the phase when the work has been fulfilled accurately; (6) to ensure the full implementation of all recommendations of the Six Sigma project; (7) to ensure that improvements identified within the nominated projects are accomplished and maintained; and (8) to provide that completed projects are evaluated for potential application across other businesses or elsewhere within the same business.

**v) Master Black Belt**

The role of the master black belt is to support the black belts in the application of the DMAIC methodology and the selection and use of the tools and techniques required. In particular, the master black belt is (1) a trainer and mentor of the black belts in the utilisation of the DMAIC method and the choice and usage of the tools and techniques needed, (2) affords support so that improvements recognised within the specified projects are achieved and sustained, (3) gives internal consultancy in advanced statistics, (4) assists in the description of proper improvement projects, (5) helps in the resolution of the field of the chosen improvement project, (6) assists in recurrent reviews of the improvement projects, (7) affords training in the tools and techniques connected with Six Sigma to black and green belts as required, (8) determines if any training actions are suitable and sufficient, and (9) points out improvement projects as needed.

#### **vi) Black Belt**

The black belt is responsible for delivering the accepted advantages of the project to the organisation. Given that, the black belt (1) acts with others to recognise and evaluate opportunities for improvement, (2) organises multidisciplinary teams (process organisation), where required, and maintain improvement projects, (3) leads improvement projects or facilitates green belt projects using the DMAIC methodology, (4) trains, coaches, and guides green belt on the DMAIC approach and connected process improvement methods, and (4) participates in all gate reviews directly through prepared presentations of the work accomplished to-date with an emphasis on the accomplishments in the phase being analysed.

#### **vii) Green Belt**

The green belt is responsible for delivering the recognised advantages of a project to the organisation. The member of green belt is responsible for understanding and assessing possibilities for improvement by working with the line management, working as a member in the project under the charge of a black belt, executing a simple project under the control of a black belt, and mentoring yellow belt members.

#### **viii) Yellow Belt**

Yellow belt members are usually known as a process operator. Their tasks are to work with the green belt members to determine and assess possibilities for improvement, work under the management of a black belt or a green belt as a member of a massive Six Sigma project led by the black belt and join in a smaller Six Sigma project.

### 2.4.9.2 Six Sigma Implementation Process in the Dubai Police

A Six Sigma project in the Dubai Police employs the DMAIC methodology, following the standardisation of ISO 13053-2011 (ISO 13053, 2011). Each step of the DMAIC methodology is followed in the sequence of define, measure, analyse, improve, and control. However, once data have been collected and investigated the project is reviewed and, if necessary, re-defined, re-measured, and re-analysed as illustrated in Figure 2.2. Regular reports are presented to the sponsor of the project at all phases. Regular gate reviews are conducted with the project sponsor at each phase of the DMAIC process.

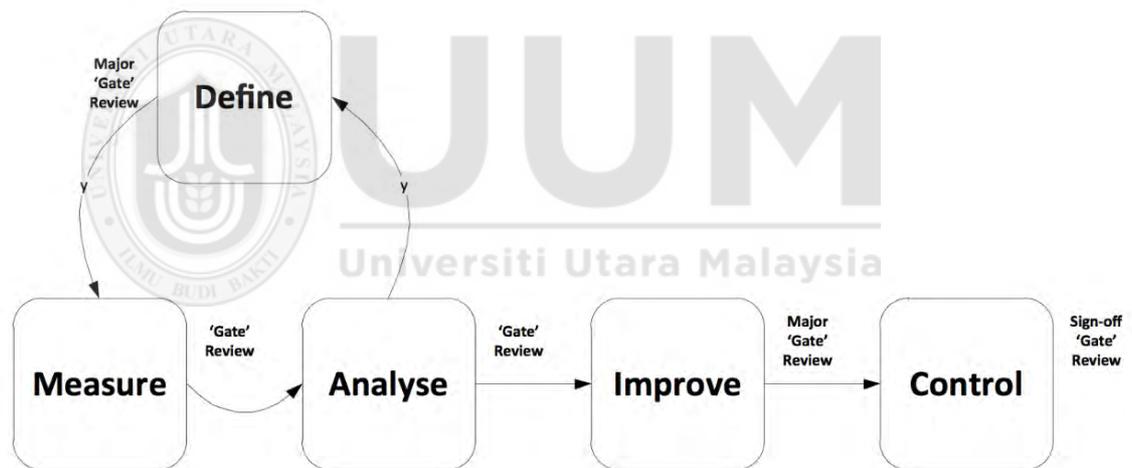


Figure 2.2  
*Six Sigma DMAIC process*  
Source: ISO 13053 (2011)

#### i) Define phase

This phase is intended to identify the requirements and expectations of the stakeholders, recognise the voice of the customer and third parties, select the project

team, develop a process map (SIPOC), visualise the data (Pareto), and create a project charter.

A project charter is the outcome of this phase, which lists what is observed to be wrong. The project charter states the description of the problem and includes data about the size of the problem and its influence on the strategic priorities and financial impact. The scope and objective of the project should be accomplished at the end of the project both in operational and financial terms.

### **ii) Measure phase**

This phase aims to develop a data collection plan, collect the data, evaluate the data, and create a baseline of recent process performance. In this phase, all data regarding the variables that are supposed to influence the issue should be handled. Before starting to collect data, however, an assessment should be made of the efficacy of the measurement processes that the project will depend on. All measurement systems to be used should be capable of providing data to the required level of accuracy and repeatability. This includes measurement processes that result in discrete type data. If there is any scepticism regarding the quality of the data, any statistical analysis that is consequently offered might be invalid.

### **iii) Analyze phase**

This phase aims to recognise the gaps among baseline performance and targets, understand the root causes of variation, and prioritise improvement chances. The data obtained throughout the measure phase above is analysed in detail by employing appropriate statistical techniques to identify, prove or verify the importance of the

crucial process input variables (KPIVs). The first three phases of DMAIC should be repeated until the project definition is stable.

#### **iv) Improve phase**

This phase seeks to achieve a robust improvement in the process. Several activities and techniques are used. During this phase, any handicaps that will affect the selected solution from being implemented and overcome them are identified. Methods to overcome any potential disadvantages are determined before the process modification is performed.

#### **v) Control phase**

The effectiveness of the solution is confirmed by collecting and analysing fresh data. A forward plan for the ongoing “control” of the process is prepared for use in the area in which the process exists. The improved process is handed over to the project sponsor and the area in which the process exists after the necessary process improvement has been approved. A process audit is carried out and its findings reviewed approximately six months from the end of the project. A date for the process audit is determined before the “hand over”. In this stage, a final report is written and circulated to interested parties. The report is filed for ready access by others. All reports are formatted in a standard way and indexed by keywords. The report shows the lessons learnt to be transferred to future Six Sigma project teams.

### **2.4.10 The Relationship between Six Sigma and Organizational Performance**

Six Sigma approach has emerged as a structured and systematic methodology aimed to achieve continuous improvement in the never-ending journey (Choo, Linderman, &

Schroeder, 2007; Linderman et al., 2006; Oruako, 2014). It is a management system that assists organisations in achieving business excellence (Albeanu & Hunter, 2017; Salah, Rahim, & Carretero, 2010), improve organisational performance (Chiarini, 2013; Khaidir et al., 2013; Gunawan & Karimah, 2017; Kumar et al., 2009; Yusr & Othman, 2011), and enhance financial outcomes (Bateh & Farah, 2018; Swink & Jacobs, 2012). Harry (1998) asserted that Six Sigma could help organisations eliminate defects from products, transactions, and processes (Tomkins, 1997), resulting in improved quality, increased profitability, enhanced customer satisfaction, and a growing market share (Bateh & Farah, 2018; Shafer & Moeller, 2012; Tiwari, Antony, & Montgomery, 2008). Six Sigma also has a role in improving effectiveness and efficiency of an organisation (Kumaravadivel & Natarajan, 2013; Breyfogle, Cupello & Meadows, 2000) and gaining competitive advantage (Desai & Prajapati, 2017; Shafer & Moeller, 2012).

An extensive review of the previous studies on the relationship between Six Sigma and organisational performance (see Appendix B-1) suggests a positive and significant impact of Six Sigma on performance (Ahmed et al., 2018; Ali et al., 2016; Gunawan & Karimah, 2017; Hilton et al., 2008; Hwang et al., 2017; Jacobs et al., 2015; Mishra & Sharma, 2017; Mustafa & Jamaluddin, 2017; Nayeri & Rostami, 2016; Patyal & Koilakuntla, 2017; Shah et al., 2008; Sin et al., 2015; Singh et al., 2017; Swink & Jacobs, 2012; Uluskan et al., 2017; Zu et al., 2008).

Six Sigma can also handle customer complaints (Abreu et al., 2012), improve performance improvements (Braunscheidel et al., 2011), save cost (Pande et al., 2000; Thomas, Francis, Fisher, & Byard, 2016), increase return on investments (Pyzdek & Keller, 2014; Swink & Jacobs, 2012), enhance innovation (He et al., 2017;

Braunscheidel et al., 2011), and reinforce team goals (Linderman et al., 2006). Berdebes (2003) noted that organisations that used Six Sigma spend less than 5 per cent of their profit to resolve problems and decrease the cost of poor quality, leading to increased profits. Similarly, Chen, Chen, and Hsia (2005) indicated that the profit of General Electric increased by USD750 million in 1998 after implementing Six Sigma practices. Also, the stock price of Motorola increased 21 per cent in 2000 as a result of Six Sigma implementation (Chen et al., 2005). Samsung also doubled its sales within 24 months by 9 per cent and tripled the profit to USD530 million as a result of applying Six Sigma (Creveling, Slutsky, & Antis, 2003).

In short, many other studies deduced that Six Sigma implementation contributed to improved productivity and annual savings (Antony et al., 2005; Kovach, Curiel, Franklin York, Bogard, & Revere, 2017; Kwak & Anbari, 2006; Prashar, 2016). Hoerl (1998), for example, pointed out that implementing Six Sigma initiatives in General Electric Corporation had led to expanding its operating margins from 13.8% to 14.5%. Accordingly, Antony (2015) stated that Six Sigma contributes to improved customer satisfaction through eliminating defects and deficiencies of the process, leading to profitability (Choi, Kim, Leem, Lee & Hong, 2012) and organisational performance (Braunscheidel et al., 2011).

However, when analysing the relationship between Six Sigma and organisational performance to define the significance of the correlations, inconsistent results of correlation coefficient as shown in Table 2.2 are found. The result was arrived by Davis's (1971) recommendation where  $r = 0.01$  to  $0.09$  indicates negligible correlation,  $r = 0.10$  to  $0.29$  low,  $r = 0.30$  to  $0.49$  moderate,  $r = 0.50$  to  $0.69$  substantial,

$r = 0.70$  to  $0.99$  very high, and  $r = 1.0$  perfect correlation. The values reported in the past range from negligible to very high correlation.

Table 2.2  
*Correlation Coefficient of the Studies Between Six Sigma and Organisational Performance*

Source	Industry	Result		
		Sig.	Correlation Coefficient	
			Value	Range
Hwang et al. (2017).	General	$P < 0.050$	0.626	Substantial
Gunawan and Karimah (2017).	Manufacturing	$P < 0.000$	0.38	Moderate
Mishra and Sharma (2017).	General	$P < 0.050$	NA	NA
Kumar et al. (2009).	Manufacturing	$P < 0.050$	NA	NA
Swink and Jacobs (2012)	Manufacturing	$P < 0.050$	NA	NA
Shah et al. (2008).	Manufacturing	$P < 0.001$	0.284	Low
Zu et al. (2008).	Manufacturing	$P < 0.010$	0.44	Moderate
Linderman et al. (2006).	Manufacturing	$P < 0.001$	0.38	Moderate
Sin et al. (2015).	Manufacturing	$P \leq 0.000$	0.155	Low
Mustafa and Jamaluddin (2017).	Manufacturing	$P > 0.05$	0.132	Low
Patyal and Koilakuntla (2017).	Manufacturing	$P < 0.01$	0.38	Moderate
Ali et al. (2016).	Manufacturing	$P < 0.05$	0.042	Negligible
Uluskan et al. (2017).	Textile and apparel industry	$P < 0.05$	0.215	low
Habidin and Yusof (2012).	Automotive Industry	$P < 0.001$	0.681	Substantial
Jacobs et al., (2015).	Firms that adopted Six Sigma	$P \leq 0.05$	0.148	Low
Ozkan, Rubio, Hassan and Davis (2017).	Fortune 500 companies	$P < 0.10$	NA	NA
Hilton et al., (2008).	Hospitals	$P < 0.010$	0.55	Substantial
Nayeri and Rostami (2016).	Banking industry	$P < 0.001$	0.82	Very high

NA= not available or not applicable.

The reason for these inconsistencies is due to the lack of understanding of the benefits of Six Sigma and its cultural barriers (Antony, 2017) and political influences (De Almeida et al., 2017). Culture is one of the most influential factors that should be considered for successful implementation of Six Sigma projects (Antony et al., 2018; Gunawan & Karimah, 2017). Indeed, Nonthaleerak and Hendry (2007), who investigated 11 firms that implemented Six Sigma in Thailand, found that organisational culture had a significant effect on the successful implementation of Six Sigma. Basu and Wright (2012) mentioned that Six Sigma is not just a statistical method to gauge variance; it is considered a process and culture to accomplish organisational excellence. It provides a structure and promotes an organisational culture that boosts the identification of opportunity, process analysis, and the creation of sustained improvements (Swink & Jacobs, 2012). Therefore, successful implementation of continuous improvement tools requires significant changes in the culture of the organisation (Antony & Banuelas, 2002; Cheng, 2007; Gunawan & Karimah, 2017; Kwak & Anbari, 2004; Mustafa & Jamaluddin, 2017). Further, successfully integrating both the human aspects (such as culture change, customer focus, training, etc.) and the process aspects (such as process stability, capability, variation reduction, etc.) will enhance such implementation (Antony et al., 2005). Six Sigma does not just focus on using various continuous improvement methodologies but also the process of matching these methods with the organisational culture and available resources within the organisation to yield useful implementation results (Gorantiwar & Shrivastava, 2014), as well as changing the attitudes and adjusting employees to suit with the culture (Antony & Banuelas, 2002; Eckes, 2001).

Adopting a Six Sigma methodology is always a challenge for any organisation (Antony et al., 2017c). Numerous researchers asserted that the successful implementation of a

new strategy relies on the willingness of the organisation's members to adopt such strategy and also the willingness and commitment of top management to support cultural transformation (Braunscheidel et al., 2011; Hernandez, 2017). Once an organisation begins a process of transformation towards continuous improvement, it is important to understand Six Sigma methodology and work to deploy it in the organisation (Ozkan et al., 2016) and establish an appropriate culture that provides a secure and flexible work environment for employees (Hernandez, 2017). Such a work environment will encourage the active participation of teams in Six Sigma projects and develop individual creativity (Hwang et al., 2017). This perspective is supported by Bhuiyan and Baghel (2005) who defined continuous improvement as a culture of sustained improvement seeking to eliminate waste in all organisation's process and systems including employees in the organisation without having to allocate a big budget (Mustafa & Jamaluddin, 2017).

Other obstacles that could explain the inconsistent results are a superficial implementation (Plenert, 2017), too much bureaucracy involved in quality initiatives (Hackman & Wageman, 1995), and the effect of Six Sigma implementation in an organisation may need a long time to appear (Ozkan et al., 2016). Accordingly, in-depth research is required to study the effect of culture on the relationship between Six Sigma and organisational performance (Linderman et al., 2006; Schroeder et al., 2008). Indeed, it is argued that there is no integrative model for recognising the parts that discriminate among successful or failed implementations of quality improvement initiatives including Six Sigma (Hackman & Wageman, 1995). Nevertheless, successful organisations have considered comprehensive aspects of quality that do not focus on zero defects only but also on exploring for innovative services and products. Therefore, sustaining the current rules is no longer enough, and today's continuous

improvement methods should attempt to establish a culture that encourages innovation (Weick, 2000).

On the implementation of Six Sigma in public organisations, Garcia (2015) stated that applying a Six Sigma method in such organisations could be even more challenging because this is an area characterized by a lack of standard procedures and a lack of knowledge about customers' needs, especially because of employee resistance to changing their current culture to adopt one based on continuous improvement. Likewise, Shahin, Attafar, and Samea (2012) argued that the application Six Sigma in the public sector is a hard task. This due to the complexity of organisational structure as well as its administration (Shahin et al., 2012). Study by Garcia (2015) revealed that the public sector tended to focus on implementing a Six Sigma methodology to obtain fast results when it should have focused its efforts on designing the processes to reach long-term goals that, in turn, will allow them to sustain a culture of continuous improvement over time. He further contended that the success of the Six Sigma implementation could be recognised by training and developing employee commitment to understand and engage with the Six Sigma methodology.

The literature indicates that Six Sigma is still in the early stage in the Middle East (Albliwi et al., 2017). Furthermore, its application in the public sector and service industry is still lagging (Alsyouf et al., 2018; Antony et al., 2017a, 2017c). There are also very few studies in this area (Chiarini, 2013; Kuvvetli & Firuzan, 2017), particularly in police agencies (Antony et al., 2017b). Indeed, Shokri (2017), who analysed research studies and publications of Six Sigma within last two decades, found a research gap on studies in the service industry since most studies focused on limited areas and sectors and ignored other sectors such as the service industry. Furthermore,

some scholars argue that Six Sigma is still subject to the same criticisms and limitations of traditional quality management (Dahlgaard & Dahlgaard-Park, 2006) and misunderstanding, undermining its effectiveness (Lee-Mortimer, 2006; Mostafa, Dumrak, & Soltan, 2013; Rodgers et al., 2018). Therefore, it is important to understand the organisational and contextual variables (Schroeder et al., 2008) and cultural values (Zu et al., 2010) that could either facilitate or hinder the success of Six Sigma implementation (Schroeder et al., 2008). It is argued that creating an appropriate culture is critical to the successful implementation of Six Sigma (Antony & Banuelas, 2002; Cheng, 2007; Galli, 2019; Kwak & Anbari, 2004; Ng & Hempel, 2017). However, despite the importance of culture in the successful implementation of Six Sigma (Antony, 2004b; Goffnett, 2004), studies that investigated the influence of Six Sigma on culture (Zu et al., 2010) are limited. Thus, Schroeder et al. (2008) advocated that the implementation of Six Sigma and the required changes in culture and structure to achieve the needed success are investigated.

## **2.5 Kaizen**

Kaizen is a crucial part of business philosophy called “Lean” (Ohno, 1988). Toyota Corporation developed Kaizen in the 1960s under the name of Toyota Production System (TPS). TPS aims to eliminate defects, add value factors, and increase production in its manufacturing systems, therefore making it a continuous improvement process as a dominant culture in the organisation. In other words, TPS originated from Lean, which took 30 years to develop and improve to reach the recent model of Kaizen.

Womack, Jones, and Roos (1990) pointed out that Lean philosophy was a revolution in the manufacturing world. The Lean practices are not limited to manufacturing; they

can be employed in the management, human resource management domains and so on (Stone, 2012). Imai (1989) expanded the benefits of Kaizen to improve personal, social and home life. It is a life philosophy that assists in improving and enhancing all aspects of life (Khayum, 2015). Operationally speaking, Kaizen has also been considered a tool for problem-solving and making improvements over time (Imai, 1986; Sawada, 1995; Natale, Uppal & Wang, 2014). Improvement of performance includes each process in the organisation; thus the employees at the gemba (the actual place) are responsible for improving the appropriate standards (Imai, 1997). This guiding principle is implemented through team building teams by following a set of steps (Sawada, 1995).

### **2.5.1 Kaizen Definition**

Kaizen is a philosophy of thinking and management that can be adopted in all aspects of life (Imai, 1986). Kaizen is the Japanese language which contains two words “KAI” that means change and “ZEN” that means better (Donaldson, 2002). The Kaizen word has been translated into western literature to mean continuous improvement (Macpherson, Lockhart, Kavan, & Iaquinto, 2015; Malik, Li-bin, Ye-zhuang, & Xiao-lin, 2007). That is, Kaizen is taken to mean the gradual progress of continuous improvement and increasing value (Karkoszka & Szewieczet, 2007).

There are many definitions of Kaizen. Mendez and Vila-Alonso (2018) defined Kaizen as a management approach that aims to get value for stakeholders. It represents a set of principles that help organisations grow and continuously improve (Suarez-Barraza & Miguel-Davila, 2011). Similarly, Brunet and New (2003) stated that Kaizen is a continuous, incremental, and participative activity and considered these three elements as crucial principles of Kaizen. Brunet and New (2003) argued that:

1. Kaizen is a continuous mechanism and a never-ending journey towards efficiency and quality. This principle is related to the Japanese culture which has a significant long-term orientation (Recht & Wilderom,1998).
2. Kaizen is an incremental process (Imai, 1986).
3. Kaizen entails participation of all the workforce in the organisation including top management, managers, and workers (Imai, 1986).

Regardless of the many definitions, the most famous definition was offered by Imai (1986, p.20), who defined Kaizen “as an improvement or continuous improvement in social life, home life, personal life and working life. In the workplace, Kaizen means continuous improvement involving everyone, managers and workers alike.”

### **2.5.2 Kaizen as a Part of Lean Manufacturing**

The Lean approach aims to achieve perfection by determining and eliminating factors and wastes that do not add value to the process (Mendez & Vila-Alonso, 2018). At the heart of Lean manufacturing lies Lean thinking. Lean thinking aims to get all people in the organisation to work together to create value by continuously eliminating waste. This process of Lean is supposed to be dynamic, customer focused, and knowledge drive to accomplish the desired objectives (Imai, 1986).

Lean thinking contributes to understanding the Lean principles including value identification, waste elimination, and process flow generation (Womack & Jones, 2010). According to Shah and Ward (2003), Lean manufacturing provides insight into a rethinking of confronting the challenges by producing goods and service and delivering them to customers better than the competitors. The philosophy of Lean

manufacturing revolves around designing a manufacturing system based on maximising profit and minimising cost.

Kaizen is a key and leading tool of Lean approach (Kovacevic, Jovicic, Djapan & Zivanovic-Macuzic, 2016; Nordin, Deros, & Wahab, 2010). It is referred to as the key building block of Lean thinking (Kumar, Dhingra & Singh, 2018). It follows an umbrella concept which focuses on the process improvement by eliminating wastes in the process (Imai, 1986), which could lead to improvements in quality, cost, flexibility, and productivity (Chadha, 2017; Mendez & Vila-Alonso, 2018; Singh & Singh, 2015).

### **2.5.3 Kaizen Tools and Techniques**

Kaizen employs many tools for successful implementation. Imai (1986) listed a set of these tools that include 5S, Poka-Yoke, Hoshin Kanri, Quality Control Circle, suggestion system, Total Quality Control, Automation, Just-in-time, Kanban, Total Productive Maintenance, and Quality Improvement as shown in Figure 2.3. These tools are known as a Kaizen umbrella (Imai, 1986). Some of these approaches have received much attention and have been successful in improving quality and productivity (Cooper, Keif, & Macro, 2007; Singh & Singh, 2015), and practitioners employ different techniques during the implementation of Kaizen projects relevant to the area of application.



Figure 2.3  
*Kaizen Umbrella*  
 Source: Imai (1986)

#### 2.5.4 Kaizen Wastes

Kaizen aims to eliminate waste. There are three kinds of waste: Muda, Mura, and Muri. Muda is a Japanese term that refers to value-added work. That is, Muda is any activities that are wasteful and do not add value. Mura and Muri are not that well known because they are perceived to be less important. However, Mura and Muri create Muda; so, it is vital to concentrate on them as well (Liker, 2004).

#### 2.5.5 Kaizen Implementation in the Public Sector

Public sector organisations face increasing pressure from the public to provide better and faster services and control the expenditure (Suarez-Barraza & Miguel-Davila, 2014). The services provided are heterogeneous, affecting the quality and response time (Speller & Ghobadian, 1993). Besides, employees in public organisations suffer from scarce resources and working under pressures from various stakeholders (Pollit,

2006). Therefore, to address these issues, many public organisations have begun to apply Kaizen to create value for customers and eliminate wastes and errors in the processes (Suarez-Barraza & Miguel-Davila, 2014). Since the early 1990s, Kaizen had become one of the most critical concepts in the management of the public sector as an approach to decreasing operating budgets and addressing fiscal deficits (Pedersen & Huniche, 2011; Thong, Yap, & Seah, 2000). This is because Kaizen can reinforce management practices to fulfil greater quality standards and flexibility to meet increasing customer demands for more efficient services and efficiency by reducing wastes (Pedersen & Huniche, 2011; Suarez Barraza et al., 2009).

However, despite the importance of Kaizen method in improving public organisations, there is a shortage of empirical studies in this sector (Radnor & Boaden, 2008; Radnor, Walley, Stephens, Bucci, 2006; Suarez-Barraza et al., 2009). One of these few studies was by Bhatia and Drew (2006). They concentrated on local governments and demonstrated that Kaizen provided an opportunity for improvements in many areas like citizen's satisfaction, productivity, and services. They emphasised that applying Kaizen in an organisation relies on the culture. Similarly, Suarez-Barraza et al. (2009) found that using Kaizen in Spanish Town Halls contributed to improving processes and services. However, they noted that several obstacles hindered the application of Kaizen such as political changes. According to Bhatia and Drew (2006), although Kaizen is designed to eliminate waste, inflexibility, and variability, the principles and themes of Kaizen may pose some challenges to public organisations. For instance, Kaizen aims to add value to customers; however, in public organisations, it is not easy to identify customers and compete with others. Suarez-Barraza and Miguel-Davila (2014) also noted that much Kaizen research concentrated on private sector organisations. Because Kaizen could provide a clear and fast impact on the social and

technical domains it was mostly investigated in the private sector (Bodek, 2002; Melnyk, Calantone, Montabon, & Smith, 1998; Oakeson, 1997). Therefore, there is a considerable gap in the public sector (Suarez-Barraza & Miguel-Davila, 2014), and there is a lack of effort to investigate and assess the impact of Kaizen in such sector (Radnor & Boaden, 2008; Suarez-Barraza et al., 2009) perhaps because of the weakness in the implementation over the years (Suarez-Barraza & Miguel-Davila, 2014).

Suarez-Barraza et al. (2009) also stated that the scarcity of research in the public sector could be due to how Kaizen is implemented. Many public organisations are being confronted with the challenges to design, manage and improve Kaizen (McAdam & Saulters, 2000; Suarez-Barraza & Ramis-Pujol, 2010). Besides, the recommendations given by scholars to apply Kaizen in such sector tend to be abstract, vague, and even contradictory (Van Aken, Farris, Glover, & Letens, 2010).

In the UAE, the applications of Kaizen are still immature, especially in the public sector. Kaizen has been applied to the health industry (Dulaimi & Ellahham, 2016; Ellahham, Aljabbari, Mananghaya, Raji & Al Zubaidi, 2015; Ellahham, 2016) and construction industry (Al-Hajj & Hamani, 2011; Al-Aomar, 2012; Agyekum, Ayarkwa & Adjei-Kumi, 2013) but not much in the field of policing (Antony et al., 2017b).

### **2.5.6 Kaizen in Police Agencies**

Two current challenges facing police agencies are a reduction in resources and the increasing complexity of crime. Moreover, police agencies are being asked to respond to greater public demand for service than in the past (Fryer, Antony, & Douglas, 2007),

prompting them to find ways to improve their capability and deliver a better value for stakeholders by improving overall efficiency and effectiveness (Cohen, Plecas, McCormick, & Peters, 2014). Undertaking evaluations and participating in continuous improvement strategies require the involvement of all members of police agencies. All members of these agencies must take responsibility for improving efficiency. To achieve this goal, many police agencies are turning to management strategies, such as the use of a Kaizen to enhance efficiency and effectiveness.

Several service organisations have implemented and benefited from Kaizen. However, Kaizen practices in police agencies are still limited (Antony et al., 2017b). While anecdotal evidence exists about the implementation of Kaizen, empirical evidence is limited (Antony et al., 2017bc). Moreover, since there is no full-scale implementation of Kaizen in police agencies, long-term successes could not be ascertained (Barton, 2013b). Furthermore, in the UAE, the application of Kaizen is still its early stage even though some private organisations have implemented it (Al-Hajj & Hamani, 2011; Al-Aomar, 2012; Agyekum et al., 2013; Dulaimi & Ellahham, 2016; Ellahham et al., 2015; Ellahham, 2016). As a new concept in the UAE, little is known about its applicability in the public sector and especially police agencies. Therefore, research is required to better understand the effect of Kaizen on the performance of the police agencies.

### **2.5.7 Kaizen in the Dubai Police**

There has been a continuous discussion on how to enhance quality and decrease costs of public services in the UAE, resulting in the employment of many improvement initiatives and techniques. Recently, many practitioners suggested transferring Kaizen

practices from the private to the public sector because the Kaizen practices have been found to improve the organisational system and processes.

As mentioned earlier, eliminating waste is the primary goal of Kaizen (Suarez-Barraza et al., 2009) by identifying and removing waste (Imai, 1986). Hence, Kaizen is not a time-specific project; rather, it is a process of activities implemented continuously (Sawada, 1995).

Kaizen concentrates on tiny and continuous improvements in work patterns. For improvements to take place, specific standards are necessary (Imai, 1986). For that, the PDCA cycle (Plan-Do-Check-Act) is applied to maintain the desired results. Dubai Police employs the cycle of PDCA to conduct project of Kaizen.

#### **2.5.7.1 PDCA Cycle and Kaizen**

According to Deming (1994), PDCA is a notion for continuous improvement. It is a systematic method of problem-solving. The PDCA cycle should be recognised as a never-ending wheel for conducting improvement towards a perfect situation. The "Plan" step aims to build goals and processes or countermeasures with a demanded consequence based on future forecasting or previous performances of work. The "Do" step seeks to perform the countermeasures or processes purposed. The "Check" step measures the accomplishment or effectiveness of the countermeasures or processes by determining any variations between expected outcomes the actual outcomes. The last step "Act" aims to investigate the variations to recognise the reasons for a gap and conduct the required action to promote changes.



Figure 2.4  
*PDCA Cycle*

The cycle of PDCA is the concept behind the Kaizen method. It is wheel-like as described in Figure 2.4. Despite being a wheel-like concept, Kaizen may end at the "Act" step. Kaizen tries to improve quality, productivity, workplace, and safety in a continuous upward spiral through wheeling the PDCA wheel by considering the attainment of Kaizen and demanding effort to develop the direction for the next Kaizen.

#### **2.5.7.2 Kaizen Implementation Process in the Dubai Police**

PDCA is adopted as the spine of the Kaizen process; however, it differs from the initial PDCA cycle. The initial PDCA wheel is often known as a “closed wheel”. However, the “PDCA” used in the Kaizen project in the Dubai Police is not a “closed wheel”. It is an open quality spiral wheel that contains five steps. The PDCA cycle contains four steps only and often end at the “Act” step. Table 2.3 clarifies how the PDCA steps match each step in the original Kaizen process.

Table 2.3  
*Kaizen Implementation Process in the Dubai Police*

PDCA Cycle Steps	Kaizen Process Steps
1. Plan	1. Selection of Kaizen project
	2. Project Analysis
	3. Identify countermeasures for solving Kaizen project
2. Do	4. Implementation of identified countermeasures
3. Check	5. Check Results Achieved
4. ACT	6. Standardization and Sustainability

As illustrated in Table 2.5, six steps are followed to develop a Kaizen project in the Dubai Police. The detailed explanation of each Kaizen process is as follows:

**i) First Step: Selection of Kaizen Project**

Selecting the project is the first step in the cycle. The step involves a participatory process. It begins with clarifying the problem and identifying the challenges employees and clients are encountering in their workplace and then select a Kaizen project that can produce quick results in a specific period with limited resources.

During the brainstorming meeting, employees propose Kaizen projects based on inputs for improvement given by stakeholders. The inputs include customer claims, employee and customer suggestions, recurring mistakes, recommendations for mystery shopper and quality evaluator, and time-consuming or complicated processes. At this stage, the feasibility of the proposed Kaizen projects is evaluated to ensure that the project is chosen properly.

## **ii) Second Step: Project Analysis**

After selecting the Kaizen projects, some statistical techniques are performed to analyse the themes to know the possible impacted factors of the project. This step requires relevant data to be collected. Once data have been collected, analysis begins by using relevant statistical tools such as a “Pareto Chart”. A Pareto Chart is suitable to prioritise points for problem-solving.

Finding the root causes of the problem is critical in determining or decreasing the obstacle. In this process, a Fishbone diagram (Figure 2.5) is one of the quality control tools utilised to recognise the root causes. It is beneficial for classifying different causes, and it can explain a causal-effect association in the chosen project. The first idea of a root cause analysis is to distinguish the problem and then work out the significant factors involved which may include people, management, process, environment, equipment, and materials. Brainstorming sessions are conducted to identify the potential causes of the problem that may be associated with the element. In the end, a diagram that shows all possible causes of the problem the team can think of is developed.

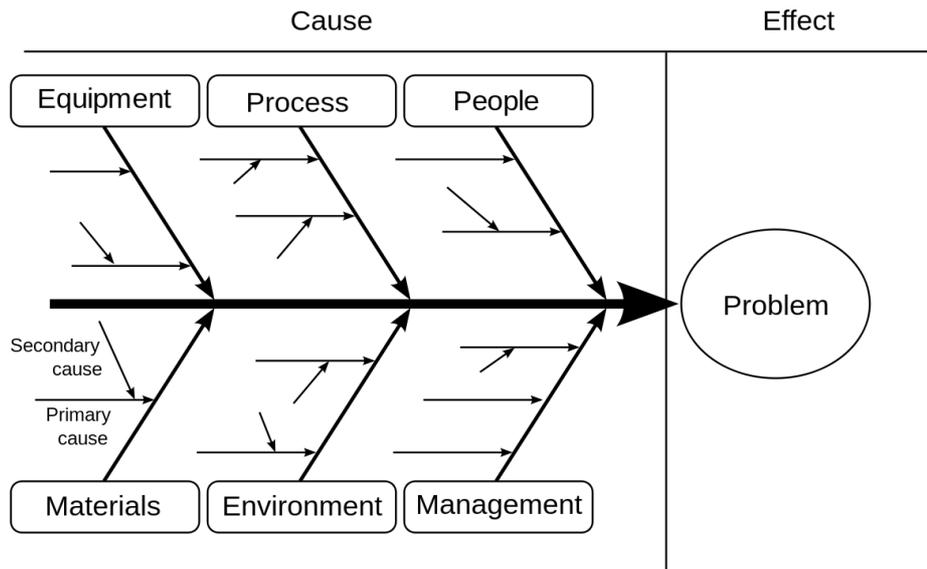


Figure 2.5  
*Fishbone Diagram*

### iii) Third Step: Identify Countermeasures

After identifying the project and its root causes analysis, next is to imagine the steps to reduce the root causes. It is essential to come up with countermeasures for eliminating or decreasing those root causes. Two quality instruments are employed to choose the countermeasures. A “Tree diagram” is applied to recognise potential countermeasures while a “Matrix diagram” is valuable for investigating the probability of those recognised countermeasures.

### iv) Fourth Step: Implementation of Identified Countermeasures

The team will execute countermeasures assessed as being “feasibl”. The period of implementing the “feasible countermeasures” normally takes between two and ten weeks.

**v) Fifth Step: Check Results Achieved**

After the implementation of the recognised countermeasures, the effectiveness of the countermeasures must be weighed. Table 2.4 is used to compare the results before and after Kaizen activities.

Table 2.4  
*Results Before and After Kaizen Implementation*

Mistake	Results before Kaizen	Results after Kaizen	The difference	Achieved rate

**vi) Last Step: Standardization and Sustainability**

After observing the results achieved in step six, it is essential to prevent recurrence and achieve sustainability of the results obtained. Therefore, standardisation of the useful technique is required. “Standardisation” does not simply mean “standardised methods”; however, all workers in the department/section must practice the “standardised” manner to prevent problems from recurring and ensure the sustainability of results.

All project team members have to follow the documented measures continuously. Thus, constant monitoring against the checklist is essential to comprehend how the team members prepare and sustainably guarantee the standardised approach (Table 2.5). The period of direction should be accepted within the team and shared with every team member.

Table 2.5  
*Follow-up of Standardized Measure*

Date	Check by	Standardized measures	Implementation status	
			<input type="checkbox"/> Following	<input type="checkbox"/> Not Following

### 2.5.8 Relationship between Kaizen and Organizational Performance

Kaizen is one of the continuous improvement tools that can be used to improve personal and work life (Imai, 1986). It is a tool for problem-solving and conducting improvements over time (Imai, 1986; Sawada, 1995). An extensive review of the literature (see Appendix B-2) indicates that Kaizen has a positive and significant impact on organisational performance (Abadi et al., 2018; Adesta et al., 2018; Anh et al., 2015; Asaad et al., 2015; Hofer et al., 2012; Mutua et al., 2018; Nguyen, 2019; Rahman et al., 2010; Shah et al., 2017; Shurrah & Hussain, 2018; Yasar et al., 2017; Yang et al., 2011; Zarinah et al., 2017). It also helps increase productivity (Ee Shuang, 2012), improve the quality system (Kumar et al., 2017), and enhance employee performance and quality of work life (Aurel et al., 2015; Hyland et al., 2004; Von Thiele Schwarz et al., 2017). Doolen, Van Aken, Farris, Worley, and Huwe (2008) noted the effect of Kaizen on an organisation in two ways: improves the performance of the targeted area and enhances the outcomes of human resource.

However, when past empirical studies on the relationship between Kaizen and organisational performance were analysed, the present study found inconsistent correlation coefficient values as shown in Table 2.6. The different degrees of correlation range from negligible correlation (Asaad et al., 2015), low correlation (Yang et al., 2011; Yasar et al., 2017), moderate correlation (Sajan et al., 2017),

substantial correlation (Rahman et al., 2010), and very high correlation (Fullerton et al., 2003).

Table 2.6  
*Correlation Coefficient of the Studies Between Kaizen and Organisational Performance*

Source	Industry	Result		
		Sig.	Correlation Coefficient	
			Value	Range
Zarinah et al. (2017).	Manufacturing	P<0.05	NA	NA
Asaad et al. (2015)	Automotive Company	P<0.05	0.0111	Negligible
Rahman et al. (2010)	Manufacturing	P<0.01	0.556	substantial
Anh et al. (2015)	Manufacturing	P<0.05	NA	NA
Yasar et al. (2017).	Manufacturing	P<0.001	0.29	Low
Zhou (2016).	SMEs	P<0.05	NA	NA
Hofer et al. (2012).	General	P<0.05	NA	NA
Fullerton et al. (2003).	Manufacturing	P<0.01	0.70	Very high
Yang et al. (2011)	Manufacturing	P<0.05	0.206	Low
Sajan et al. (2017)	Manufacturing	P<0.01	0.459	Moderate

NA= not available or not applicable

The reason for these inconsistencies could be due to the impact of organisational culture on the successful implementation of Kaizen projects (Garcia, 2015; Henrique, 2018; Oki, 2012; Zailani, Shaharudin, & Saw, 2015). Ignoring organisational culture when applying Kaizen may hinder organisations from getting the required success (Oki, 2012). According to Abdulmouti (2015) and Oki (2012), Kaizen relies heavily on culture. Culture is critical to support the application of Kaizen in organisations (Zhou, 2016). Kaizen generates a culture that lets employees be more creative, enabling the organisation to react quickly to change (McAdam, Stevenson & Armstrong, 2000). Because culture is fundamental for successful Kaizen projects

(Garcia, Maldonado, Alvarado & Rivera 2014; Zhou, 2016), many scholars have suggested considering organisational culture to understand the inconsistent results (Anh et al., 2015).

Some scholars have questioned the effectiveness of Lean approach (Mehri, 2006; Pettersen, 2009; Radnor & Boaden, 2004; Williams et al. 1992). Bhasin (2008) noted many failure cases in the implementation of Lean. Up to 70 per cent cases of failure have been reported in the literature (Bourne, Neely, Platts & Mills, 2002; Johanson, Skoog, Backlund, & Almqvist, 2006; Sirkin, Keenan, & Jackson, 2005). Kaizen has also reported little success in companies (Garcia et al., 2014; Rink, 2005; Tanner & Roncarti, 1994) where success does not exceed 10 per cent in industrial organisations in the USA (Rink, 2005). Similarly, many attempts at implementing Kaizen in Mexican companies have failed (Garcia et al., 2014). The reasons cited for such failure include inappropriate culture, a lack of cooperation between employees and management, change resistance of employees, and a lack of execution and monitoring of the Kaizen project (Garcia et al., 2014). Garcia et al. (2014) indicated that creating a supportive culture is the most important factor to achieve the desired success in implementing Kaizen projects where good communication between employees and management is crucial to improve performance and satisfy the stakeholders. Other scholars identify a lack of experience, resistance to change and return to old routines, ignorance of training, weakness of education, shortage of commitment, and poor interconnection between an organisation's strategy and lean activities may handicap the effective implementation of Kaizen (Achanga et al., 2006; Rich & Bateman, 2003; Pedersen & Huniche, 2011; Radnor et al., 2006). Other obstacles include a lack of a continuous improvement culture (Henrique, 2018) and shortage of systematic research on Kaizen (Bateman, 2005; Farris, Van Aken, Doolen, & Worley, 2008; Farris et al.,

2009; Glover, Farris, Aken & Doolen, 2011; Glover et al., 2014; Uppal, Natale, Liszka, Wang & Taylor, 2012). Limited investigations in developing countries and on the success of Kaizen and its sustainability are also cited as hindering the successful implementation of Kaizen (Glover et al., 2014). According to Laraia, Moody, and Hall (1999), because Kaizen has long-term impacts, short-term results may not reflect the real situation.

Overall, the literature indicates that Kaizen has an impact on organisational performance; however, failure to create appropriate culture handicaps Kaizen success (Henrique, 2018; Oki, 2012). Therefore, developing an appropriate culture is essential for the successful implementation and accomplishment of good results.

## **2.6 Benchmarking**

Rapid change and competition in the business environment require organisations to adopt strategies to enhance their performance and gain competitive advantage (Inyang & Egor, 2017; Maiga & Jacobs, 2004). One widely recommended approach is benchmarking (Alvarez & Leonard, 2017; Elnathan et al., 1996; Luo et al., 2017; Prabhakar, 2017). According to Hackman and Wageman (1995), because benchmarking is effective, accepted, and popular, it is included in the Baldrige Quality Award. The literature points many examples of the widespread use of benchmarking (Bhaskar, 2016; Madsen, Slåtten & Johanson, 2017; Vaziri, 1993; Rigby & Bilodeau, 2015; Venetucci, 1992) in assisting organisations to identify the performance level that should be achieved and determining an effective method for designing processes, products, and services (Bhaskar, 2016).

Benchmarking is a systematic approach used to measure an organisation against the others in terms of the best practices and enhance high performance by providing a methodological framework to learn from the "best in the class". Through benchmarking, an organisation knows how other practices differ from their own and then applies the necessary changes to achieve the required improvements and close the gap. In other words, benchmarking aims to assist organisations in gaining a competitive advantage by borrowing ideas from others and adapting them to a new template to achieve the organisation's objectives (Besterfield et al., 2003; Hansen, McDonald & Mitchell, 2017b). For that, benchmarking has become a critical factor for organisations to create new competing opportunities, and it is one of the competitive weapons to help organisations generate higher value (Attiany, 2014).

### **2.6.1 Benchmarking Definition**

The history of benchmarking began with Xerox Corporation in the late 1970s. Xerox adopted benchmarking because of losing its market share due to Japanese competition. In its attempt to get back into the game, Xerox began a massive process to apply a benchmarking approach by comparing its processes with its competitors and drawing conclusions about its processes. Because of benchmarking, it transformed from being a failed company to a pioneer of benchmarking in the world (McNair & Leibfried, 1992). By 1983, Xerox conducted more than 230 benchmarking exercises. Consequently, benchmarking has become one of the most crucial continuous improvement tools to assist managers in improving organisational performance.

Benchmarking refers to the management approach that seeks to implement the best practice from outstanding organisations to improve organisational performance (Joo, Nixon, & Stoeberl, 2011). Goetsch and Davis (1997) stated that benchmarking is a

technique that assists organisations in learning from the best-in-class organisations and adopting the best practices as well as monitoring their processes and comparing them with the others. It involves specific tools to help organisations develop their performance and address their weaknesses (Cai, Liu, Xie, Liu, & Tuo, 2017; Kunisch, 2017; Oakland, 2003). Dubey et al. (2017) defined benchmarking as “the process of comparing and assessing operations concerning the best practices adopted in the domain”. It is a structured and continuous process for assessing an organisation's services, products and processes that can be considered as the best practice, with the aim of improvement processes (Sarkis, 2001). In the same vein, Anand and Kodali (2008) defined benchmarking as an analytical tool for strategies, performances, products or services, processes, functions, etc. compared internally or with the best-in-class organisations to assess its current standards and then conducting targeted improvements by implementing changes to scale or exceed those standards. One of the famous definitions was given by Camp (1989), who defined it as “the search for the best industry practices which will lead to exceptional performance through the implementation of these best practices” (Camp, 1989, p. 25).

### **2.6.2 Importance and Benefits of Benchmarking**

Organisations benefit from other organisations in the same industry or other industries. They can exploit the best practices available from others to amend their current practices (Kumar, 2018). This objective is rendered by benchmarking. Benchmarking can provide worthy insights into what boosts performance (Kumar, 2018). Organisations employ benchmarking to evaluate their performance, customer service, quality of products and services, and so forth. Benchmarking motivates organisations toward performance improvements by comparing their practices with the best

practices of the industry (Hyland & Beckett, 2002). Feedbacks from benchmarking usually bring a large area for improvements and propose methods to imitate practices and strategies with the possibility to accomplish greater operational performance (Bhattacharya & David, 2018).

Adewunmi and Ajayi (2016) highlighted the benefits of benchmarking in the literature. They concluded that adopting benchmarking can assist an organisation in improving its efficiency and effectiveness, resource management, goal setting, leadership, finance, innovation, and performance. It also contributes to enhancing effective value management and is seen as a tool of cost reduction (Pitt & Tucker, 2008; Tucker & Pitt, 2009; Wauters, 2005).

Another benchmarking benefit is enhanced innovation (Scupola, 2012). Pitt and Tucker (2008) mentioned that benchmarking can directly generate an innovation process by considering sources of new ideas. Similarly, Scupola (2012) labelled benchmarking as an innovation activity. Besides, as a vital tool for continuous improvement of quality (Dattakumar & Jagadeesh, 2003), benchmarking allows organisations to explore and understand their strengths and weaknesses, increase the quality of services and outsourcing (Adewunmi & Ajayi, 2016).

### **2.6.3 Classification of Benchmarking**

There are many different types of benchmarking. Codling (1996) and McGaughey (2002) classified benchmarking into three categories: internal, external, and best practice. Fong, Cheng, and Ho (2008) organised the types of benchmarking based on benchmarking content (strategic, performance, functional, process). The purpose of the relationship (collaborative and competitive) and the basis of who is being

benchmarked (internal, competitor, industry, generic, global) should be considered when benchmarking (Fong et al., 2008). Behara and Lemmink (2007) suggested other classifications based on who is being benchmarked (competitive or non-competitive, internal) or what is being benchmarked (strategic, process, generic, performance and functional). Other scholars identified three kinds of benchmarking: competitive, generic, and internal (Camp, 1989; Jaques & Povey, 2007; Magd, 2008; Massheder & Finch 1998; Moriarty & Smallman, 2009; Watson, 1993).

According to Codling (1996), internal benchmarking concentrates on the business processes of an organisation and takes place between various units inside the organisation. This type of benchmarking aims to determine the best practices, identify duplications, reduce costs, and address anomalies in activities. He argued that internal benchmarking could provide an initial and accessible approach to benchmark where departments of the organisation share the same best practices, culture, and language. External benchmarking aims to compare the processes of an organisation with the others. This benchmarking seeks to improve these processes and their efficiency, tackle anomalies and duplications, and save cost by analysing the difference between the organisation and other organisations (Codling, 1996). The purpose of the best practice benchmarking is to seek out the best-in-class organisations in a particular process and then conduct a benchmarking with them by analysing and understanding the reasons for excellence so that the organisation can learn from the best. Codling (1996) stated that best practice benchmarking provides top potential gains including significant improvement, breakthroughs and paradigm shifts. Andersen and Pettersen (1996) stated that an organisation conducts benchmarking with others to compare performance, processes, and strategy. These comparisons can provide information

about performance, strengths, and weaknesses which help the organisation to make the required improvement.

#### **2.6.4 Models of Benchmarking**

The aim of benchmarking process models is to clarify the stages that should be followed when conducting a benchmarking project. Several models of benchmarking have been developed based on the practices and experience (Adewunmi, Iyagba, & Omirin, 2017). Andersen and Moen (1999) highlighted the models of benchmarking and found 60 different models. While some organisations used four steps, others followed up to 33 steps (Anand & Kodali, 2008). Xerox model, for example, contains 10 steps (Camp, 1989). The model of the AT&T company follows 12 steps (Bemowski, 1991), and the IBM model contains 14 steps (Eyrich, 1991). Further, Spendolini (1992) developed a model that has five levels, and many other authors too developed their models.

#### **2.6.5 Benchmarking Implementations in the Public Sector**

Benchmarking practices were first applied in the manufacturing sector before they spread to the private and public sectors (Francis & Holloway, 2007). However, benchmarking in this industry has not attracted much interest (Bowerman, Francis, Ball & Fry, 2002). The application of benchmarking in public sector organisations fall under the term New Public Management (NPM), which is associated with a comprehensive reform to keep pace with the developments in the private sector (Thau, 2009 as cited in Fahlevi, 2015). The NPM concentrates on removing or lessening the variation between private and public organisations by employing and adopting the practices of the private sector in the public sector and emphasising accountability on

the outcomes and results instead of the process (Hood, 1995). The reform proponents argue that public organisations will face competition and enormous pressure which require them to change; otherwise they will experience many difficulties (Fahlevi, 2015). Kouzmin, Loffler, Klages, and Korac-Kakabadse (1999) emphasised that benchmarking is an NPM tool that seeks to change the environment of public sector organisations by creating non-market competition among these organisations by comparing their quality, performance and costs that lead to increased transparency and enhanced process of continuous learning. Besides, this comparison will encourage these organisations to compete and therefore strengthen innovation and continuous improvement (Fahlevi, 2015).

Benchmarking is one of the most useful tools to use in government agencies (Martin et al., 2014). It helps to control and monitor quality and productivity (Ogden & Wilson, 2000; Ball, Bowerman & Hawksworth, 2000). Therefore, organisations in the public sector are encouraged to employ benchmarking as a valuable management technique to accomplish value (Ball et al., 2000). Similarly, Osimo and Garies (2005) pointed out that benchmarking is considered one of the critical tools used to support policy-making in the European Union (EU). Many projects in the EU were established based on the benchmarking concept to control transparency and cost and improve efficiency amongst the European countries (Kuhlmann, & Jäkel, 2013).

Kouzmin et al. (1999) mentioned that benchmarking in public sector organisations is similar to that in the private sector; however, they listed some challenges. They contended that benchmarking in private organisations helps to enhance cooperation which in turn motivate competition for market share. However, in public agencies, the role of benchmarking is to activate and strengthen collaboration and competition

between these organisations to achieve public services (Kouzmin et al. 1999). They stated that the race for improvement only occurs between producers of the same products and services which are lacking in public sector organisations. Likewise, some argue that public agencies have very same goals and characteristics and deliver the same services to the public. According to Dixon and Kouzmin (1994), and Dixon, Kouzmin and Korac-Kakabadse (1996), the use of benchmarking in public sector organisations is not the same as that in private organisations. For instance, it is not easy to compare a health agency with a local municipality because of the differences in their vital missions; thus, they asserted that comparison needs to be conducted on the same actor performance.

In an attempt to differentiate benchmarking practices in the public sector and private sector organisations, Bowerman et al. (2002) provided two typologies. They are compulsory benchmarking and voluntary benchmarking. Compulsory benchmarking refers to the use of data of benchmarking by other public organisations to comment publicly on the performance of these organisations. On the other hand, voluntary benchmarking relates to the self-initiated use of benchmarking to improve performance. Moreover, Kouzmin et al. (1999) stated that information gained from non-related public sector organisations could not be relied upon. Therefore, some public sector organisations resort to benchmarking with a related organisation in an attempt to tackle this issue (Frost & Pringle, 1993). Additionally, it is complicated for public organisations to determine the “best-in-class” organisations to compare with and used as a benchmark (Kouzmin et al.,1999). Tillema (2007) argued that public sector organisations have specific characteristics that may prevent them from using the information derived from benchmarking for performance improvement. He listed

these attributes including formal and informal impacts, institutional constraints, ambiguous goals, limited market exposure, and barriers to innovations.

#### **2.6.6 Benchmarking in Police Agencies**

The application of benchmarking is common within the police agencies (Doss, 2014). For instance, the California Police Department in the USA applied benchmarking to investigate different aspects of traffic policing characteristics to improve traffic activities (Lamberth, 2008). Doss et al. (2011) pointed out that benchmarking can be employed in the criminal section to reduce criminality over time. Doss et al. also indicated that benchmarking may be employed to examine the times required for police agencies to respond to emergency calls. In police training, benchmarking is used in several forms of examinations and testing (e.g., written exam scores, physical fitness scores, etc.) to recognise the acumen and skills of candidates (Doss et al., 2011). Additional approaches to using benchmarking in the police field include the utilisation of datasets on censuses, accidents, traffic violations, traffic stops, departmental comparisons, and interactions between police officers and the general public (Engel & Calnon, 2004). All of these activities include comparing some facets of current performance against the measurements that were observed at some other point in time. In a nutshell, benchmarking has been demonstrated as a successful approach to improve the effectiveness and efficiency of any organisation including police agencies. However, the implementation of the benchmarking process in police agencies is still immature (Doss, 2014).

#### **2.6.7 Benchmarking in the Dubai Police**

A recent benchmarking model has emerged to be used in public organisations that afford in-depth guidelines and directions on how to conduct a benchmarking project well. This model is called the TRADE best practice benchmarking methodology. TRADE is an acronym for the term of references, research, acquire, deploy, and evaluate (Malik, Knapman, Mann, & Director, 2018). Mann (2015) claimed that TRADE is developed to reminds users to create a robust two-way relationship with other organisations (the benchmarking partners) to share or trade information and best practices for mutual benefits. TRADE was originally developed for the New Zealand Benchmarking Club (Mann, 2015). In 2009, TRADE methodology was improved, and in 2015, TRADE expanded its usage and became the approach of choice for Dubai's Government Excellence Programme as part of its drive to promote innovation in the public sector (Malik et al., 2018).

#### **2.6.7.1 TRADE Methodology**

The TRADE methodology executes projects of benchmarking in the Dubai Police. Each step of the TRADE is followed in the sequence defined: terms of reference, research, acquire, deploy, and evaluate.

##### **i) Step One: Terms of Reference (plan the project)**

This step affords the basis for conducting a project successfully. It includes choosing the project's purpose, building team members, and improving a project plan. This stage also identifies the scope of the project, resources needed, proposed benefits, supposed timeline as well as identifying all stakeholders who will be affected by the project to guarantee that their requirements are taken into account.

**ii) Step Two: Research (research current state)**

This step entails investigating the current issue and ensures that the team members have a precise understanding of performance, processes, and systems of the organisation before benchmarking other organisations.

**iii) Step Three: Acquire (acquire best practices)**

This step aims to collect data about the specific problem or process improvement and performance in order to compare these criteria with other organisations and then learning from them. This stage also focuses on determining partners from other organisations especially those that have excellent practices and finding out what they do differently.

**iv) Step Four: Deploy (communicate and implement best practices)**

This step aims to identify the best practice conclusions from the earlier stage, determine what should be supported, and implement the change. This phase normally consists of modifying the best practices to meet the profile of the organisation, and it may include piloting the change before full deployment.

**v) Step Five: Evaluate (evaluate the benchmarking process and outcomes)**

This step is created to ensure the project delivers the proposed results defined in the first stage. It includes analysing the benefits and costs and the overall evaluation of the project.

### **2.6.8 Relationship between Benchmarking and Organizational Performance**

The literature considers benchmarking as a director of performance. It helps organisations to know and understand their need to improve performance, profitability, quality, and competitiveness (Alosani et al., 2016; Al-Tarawneh, 2014; Skandalakis & Nelder, 2001; Twaissi & Alhelalat, 2015). Underdown and Talluri (2002) stated that benchmarking is the first stage in a continuous improvement process. It contributes to achieving significant improvements in many areas such as customer satisfaction, cost saving, integration, and flexibility (Brah, Lin Wong, & Madhu Rao, 2000). Benchmarking can also help organisations to accomplish continuous improvement initiatives quickly by identifying fields that require improvement and apply these changes in a short time (Camp, 1989). According to Gottfredson, Puryear, and Phillips (2005), the capabilities of an organisation can be a source of competitive advantage. Benchmarking is one of these capabilities to help reduce time and cost, assist in making better decisions, improve quality and flexibility, enhance fast delivery (Salam & Smadi, 2016), and reinforce organisational self-assessment (Taylor, 1998). It can be employed as an approach to improve organisational performance by understanding and analysing the core competencies of an organisation's competitors (Parast & Adams, 2012) and promoting the organisation's development (M'itonga, 2017).

Maire et al. (2005) maintained that benchmarking is one of the most critical improvement tools that can assist organisations in improving their performance. A comprehensive review of the literature found that benchmarking positively and significantly impacted organisational performance (Abazeed, 2017; Attiany, 2009; Attiany, 2014; Carr & Smeltzer, 1999; Drew, 1997; Hashim et al., 2012a; Kariuki & Ochiri, 2017; Kerandi et al., 2014; Maiga & Jacobs, 2004; Mehralian et al., 2017;

Salam & Smadi, 2016; Sanchez-Rodriguez et al., 2003; Nyaoga et al., 2013; Sawasdiraksa, 2015; Voss et al., 1997; Zoakah et al., 2017) (see Appendix B-3 for details). Besides, employing benchmarking in quality management initiatives was found to contribute to quality management success positively (Knights & McCabe, 2006). Voss et al. (1997) studied the effects of benchmarking on performance in 660 European manufacturing firms. They found a significant and positive impact of benchmarking on both financial and operational performance. Another study examined the effect of benchmarking in 152 American companies and concluded that benchmarking projects were cost-effective and could assist the firms in improving their productivity and quality (Elmuti, 1998). Likewise, Akuma (2007) investigated the effectiveness of benchmarking in the ministry of agriculture parastatals in Kenya. He found that using benchmarking as a continuous improvement technique facilitates in understanding and analysing the best practices of others which can be exploited for improvement initiatives.

However, past studies mentioned above showed inconsistent results with regard to the correlation coefficients as shown in Table 2.7. The values indicated the degree of correlation ranging from low correlation (Carr & Smeltzer, 1999; Sanchez-Rodriguez et al., 2003; Sawasdiraksa, 2015), moderate correlation (Maiga & Jacobs, 2004; Nyaoga et al., 2013; Salam & Smadi, 2016; Voss, et al., 1997), substantial correlation (Abazeed, 2017; Attiany, 2009; Attiany, 2014; Hashim et al., 2012a; Kerandi et al., 2014; M'itonga, 2017).

Table 2.7

*Correlation Coefficient of The Studies Between Benchmarking and Organisational Performance*

Source	Industry	Result		
		Sig.	Correlation Coefficient	
			Value	Range
Zoakah et al. (2017).	Foods and beverage	P<0.05	NA	NA
Abazeed (2017).	Industrial Companies	P<0.001	0.522	Substantial
Kariuki and Ochiri (2017).	Dairy Cooperative Society	P< 0.019	NA	NA
Salam and Smadi (2016).	Consumer goods industry	P< 0.001	0.447	Moderate
Mehralian et al. (2017).	pharmaceutical distribution companies	P< 0.05	NA	NA
Carr and Smeltzer (1999)	National Association of Purchasing Management members	P< 0.001	0.24	Low
Sawasdiraksa (2015).	Food & beverage industry	P< 0.05	0.228	Low
Voss et al. (1997).	Manufactures companies	P< 0.05	0.336 and 0.232	Moderate
Sanchez-Rodriguez et al. (2003).	Manufacturing companies in Spain.	P< 0.05	0.145	Low
Attiany (2014)	Industrial companies	P< 0.05	0.533	Substantial
M'itonga (2017)	Bamburi Cement Limited	P< 0.01	0.512	Substantial
Attiany (2009)	Pharmaceutical firms	P< 0.05	0.533	Substantial
Hashim et al. (2012a).	Local authorities	P< 0.01	0.662	Substantial
Kerandi et al. (2014)	Commercial Banks	P<0.001	0.551	Substantial
Nyaoga et al. (2013)	Public schools	P< 0.01	0.430	Moderate
Maiga and Jacobs (2004)	Manufacturing	P<0.000	0.329	Moderate

NA= not available or not applicable.

The reason for these inconsistent results could be due to a small sample size used (Abazeed, 2017; Hashim et al., 2012a; Kariuki & Ochiri, 2017; Kerandi et al., 2014; Maiga & Jacobs 2004; Mehralian et al., 2017; Nyaoga et al., 2013; Sawasdiraksa,

2015; Zoakah et al., 2017). Thus, Abazeed (2017) and Nyaoga et al. (2013) suggested that future research should use a large sample size to understand benchmarking and its impact on organisational performance. Ignoring organisational culture when studying the relationship between benchmarking and performance could also be a factor (Hanson & Voss, 1995). Hanson and Voss (1995) suggested that before conducting benchmarking projects, an appropriate culture needs to be built where employees are encouraged to share ideas to avoid the impacts of implementation barriers. Such culture plays a critical role in enhancing a benchmarking project to positively impact organisational performance (Abazeed, 2017; Zoakah et al., 2017). Moreover, Omachonu and Ross (1994) pointed out that the link between benchmarking alone and performance is very complicated. They stated that Xerox accomplished its performance by integrating the benchmarking process with its organisational culture.

## **2.7 Innovation Culture**

Innovation has been recognised as a vital element of organisational performance (Pohle & Chapman, 2006), and the driver of competitive advantage (Assink, 2006; Aziz & Samad, 2016). It is essential for long-term growth and survival of an organisation and plays a crucial role in their future (Santos-Vijande & Alvarez-Gonzalez, 2007; Silver, Binder, Zubcevik, & Zafonte, 2016). Because turbulent business environment, technological changes and competitive pressures have an impact on management and organisational sustainability (Drucker, 1999), organisations are forced to re-evaluate their practices to meet these challenges and generate new inventions. For an organisation to be innovative, a culture that supports creativity and innovation should be developed (Horibe, 2016; Woodman, Sawyer, & Griffin, 1993).

### 2.7.1 Definition of Innovation Culture

Culture has a powerful effect on an organisation's competitiveness and success (Witteman, 2015). It also has a substantial role in the organisation by shaping values, beliefs, and commitment of employees to confront rivals to achieve organisational objectives (Kuratko & Welsch, 2004). Scholars tend to agree that culture has an impact on an organisation's innovativeness (Ab Rahman & Ismail, 2018; Ahmed, 1998; McGourty, Tarshis, & Dominick, 1996; Tidd, Pavitt, & Bessant, 2001). However, there is a disagreement of what a culture is and what it constitutes (Smircich, 1983). A broad definition of culture was offered by Schein (1997, p. 12), who defined it as a "pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems".

Likewise, there are varied definitions of innovation culture. According to Hofstede (1980), innovation culture refers to the shared common values, beliefs, and assumptions of organisational members that could facilitate the innovation process. Dobni (2008) defined it as "a multidimensional context that includes the intention to be innovative, the infrastructure to support innovation, operational level behaviours necessary to influence a market and value orientation, and the environment to implement innovation." Similarly, Gandotra (2010) described innovation culture as daily life practices of innovation activities. Streets and Boundary (2004) defined innovation culture as a culture where new ideas are created, valued, and supported. Bordia, Kronenberg and Neely (2005) conceptualised it as an ability to identify and develop new services and products and deliver them to market. According to Losane

(2013), despite the many definitions, they are not conflicting but complementing each other. For that, it can be said that innovation culture is values, norms, and attitudes toward technology, business uncertainty, entrepreneurial activities, innovation and other activities that shape human behaviour related to innovation (Didero, Gareis, Marques, & Ratzke, 2008; Hofstede, 2001).

### **2.7.2 Innovation Culture in Dubai**

Singh and Gaur (2018) indicated that innovation is imperative for growth. Innovation is a vital factor in achieving businesses and economic advantages (Nidumolu, Prahalad, & Rangaswami, 2009). Realising the importance of innovation to rebirth and growth of any economy (Pradhan, Arvin & Bahmani, 2018), the government in the UAE announced 2015 as the year of innovation where the National Innovation Strategy was declared aiming to make the UAE one of the best countries in innovation within seven years (Government.ae, 2018). The UAE government is promoting innovation in both the private and public sectors for which pioneering technologies are adopted for developing innovative products and services (Al-Ansari, 2014; Bishr, 2019; Kennedy, Amacher, & McLaughlin, 2017). It has established an environment to boost innovation and attract experiences and talents from around the world (Al-Talabani, Kilic, Ozturen, & Qasim, 2019; Bishr, 2019; Knight, 2011). It also has a strategy to transform from traditional government to smart government (Al-Azzawi, 2019; Rahman, Ahmed, & Sarker, 2015) by encouraging innovation in all government sectors (Al-Khouri, 2012; Bishr, 2019; Kennedy et al., 2017).

Since the recent trends of innovation focus on establishing new markets anchored on innovation initiatives (Kennedy et al., 2017), the Dubai Government has launched various reform strategies and initiatives to improve both public and private sector

anchored on knowledge and innovation (AlAwar, 2015; Rahman, Moonesar, Hossain & Islam, 2018) since the 1990s. The objective of these initiatives was to raise the competencies of service delivery in all channels (Rahman et al., 2018) alongside enhancing quality and performance (Rahman & Said, 2015) and developing an economy that is knowledge based instead of one that is based on natural resources. The entities of the Dubai Government started directly to include these initiatives of knowledge and innovation in their strategies. Further, in 2008, the Dubai Government Excellence Performance included innovation and knowledge transfer as a criterion for excellence (Rahman et al., 2018), which generated momentum to establish a culture focusing on innovation and knowledge in all government entities including the Dubai Police. Besides, these entities also started to establish innovation and knowledge units in their structure. According to Biygautane and Al-Yahya (2011), these initiatives succeeded to encourage the Dubai Government entities to adopt innovation and best practices to improve their service delivery and effectiveness. Moreover, by 2021, the Government of Dubai envisions to become one of the top innovators in the world for existing businesses to stay competitive and to attract more new investors (Karmakar & Sahib, 2017). To support this vision, Dubai launched the Dubai Pulse Platform where all required data of the city would be available for a real-time view (Dubai Pulse, 2018). The data enables agencies of the Dubai Government to make decisions in real-time and develop future initiatives (Dubai Pulse, 2018).

The leadership of Dubai has launched many initiatives and ambitious projects to enhance innovation. Dubai X10, for example, was launched to make Dubai as a top leader in innovation in the next ten years. This ambitious and unique pursuit seeks to enhance business and encourage research on innovation eco-systems and disruptive technology (Riaz & Mushtaq, 2017). The Industrial Strategy is another initiative to

accelerate innovation across various industries. The initiative seeks to make Dubai a sustainable city anchored on innovation.

### **2.7.3 Culture and Innovation**

Culture is one of the most vital elements that impact innovation (Carmeli, 2005; Horibe, 2016) and is one of the most critical aspects of an organisation's functioning (Schein, 1983; Yilmaz & Ergun, 2008). It can help promote innovative behaviour through specific practices such as the organisation's strategic orientation, individual selection and deployment, recognition and rewards them, and multi-functional teams (Hogan & Coote, 2014; McGourty et al., 1996). An organisation that embeds innovation into its culture is more likely to achieve its goals (Dougherty, 1997; Naranjo-Valencia, Jiménez-Jiménez & Sanz-Valle, 2016; Syrett & Lammiman, 1997). Organisational culture is key to managing innovation because it plays a vital role in generating new ideas (Zaabi, Singh & Ajmal, 2017).

Past studies have shown a positive relationship between culture and innovation (Barbosa, 2014; Gudmundson, Tower, & Hartman, 2003). However, Naranjo-Valencia, Jimenez-Jimenez and Sanz-Valle (2011) noted that innovation needs more empirical attention. Furthermore, they reported that most research that studied the relationship between organisational culture and innovation concentrated on some cultural features. Besides, Skerlavaj, Song, and Lee (2010) pointed out a shortage of empirical research works on organisational culture and its impacts on different dimensions of innovativeness.

#### **2.7.4 The Differences between Traditional Culture and Innovation Culture**

Innovation culture is related to the observed pattern of attitudes and behaviours that influence the environment of work (Pundt, Martins & Nerdinger, 2010). Establishing an innovation culture includes promoting employees to employ their professional knowledge to create and examine new ideas, recruiting and nurturing creative talent, and encouraging mobility and diversity (Sorensen & Torfing, 2015). An innovation culture can also be developed through socialisation at the workplace (Xerri & Brunetto, 2011). Through an innovation culture, an organisation is likely to achieve a sustainable competitive advantage and gain capabilities required to boost organisational performance (Calantone, Cavusgil & Zhao, 2002; Zaltman, Duncan & Holbek, 1973).

There have been many attempts to develop models to clarify and explain the relationship between culture and innovation (Buschgens et al., 2013; Dobni, 2008). A study by Buschgens et al. (2013) listed 40 cultural variables to explain the linkage between culture and innovation. These cultural variables include broad concepts such as innovation culture and support (Dobni, 2010; Gumusluoglu & Ilsev, 2009) or very narrow concepts such as tolerance for failure (Danneels, 2008). In the same vein, Dobni (2008) proposed a model for innovation culture based on multi-dimensional factors such as infrastructure, implementation, effect, and innovation intention.

According to Subramanian (1996), there are differences between innovative and non-innovative organisations. An innovative organisation has a democratic culture, an innovative statement of mission and vision, and the ability to attract and retain talented members (Hamel, 1998). It is also flexible and collaborative through knowledge sharing and learning/teaching and offers good incentives (David & Fahey, 2000).

Morris (2007) compared traditional organisational culture (i.e., a status quo culture) and innovation culture to understand the features of the latter (see Table 2.8). He noted that while traditional culture focuses on stability, avoids surprises, and employs standardised tactics to gain work efficiency, innovation culture seeks to newness in ideas and knowledge and emphasises the adoption of creative thinking and innovative tactics.

Table 2.8

*The Differences Between Traditional Culture and Innovation Culture*

No	Traditional culture	Innovation culture
1	Predictability	Un-predictability
2	Seek stability	Seek novelty
3	Focus on competence	Focus on edge competence
4	High success rate	High failure rate
5	Reinforce the organizational hierarchy	Reinforce organizational networks
6	Fear of hierarchy	Focus on creative tension
7	Avoid surprises	Embrace surprises
8	Focus on inside knowledge	Combine inside and outside knowledge
9	Easy to live with	Hard to live with
10	Corporate politics	Moving the cheese
11	Efficiency through standardization	Efficiency through innovation
12	Extend the status quo	Abandon the status quo
13	Avoid change	Embrace change
14	Measure stability	Measure innovation
15	Look for data to confirm existing management models	Look for data to contradict existing management models
16	Look for certainty	Embrace ambiguity

Source: Morris (2007)

### **2.7.5 Innovation Culture in the Public Sector**

According to Arundel et al. (2019) and Eurostat (2012), the contribution of public organisations to the gross domestic product (GDP) in economically developed countries ranges between 20 per cent and 30 per cent. Given the high economic weight of such organisations, there is increasing interest among scholars and practitioners on improving their problem-solving capacity and enhancing quality services through innovation (Arundel et al., 2015; Damanpour & Schneider, 2008; Keohane, 2013; Osborne & Brown 2011; Torfing & Ansell, 2017; Walker 2014). Due to the challenges faced by public organisations, innovation is no longer a choice (Kim, 2000; Moussa, McMurray, & Muenjohn, 2018; Krishnakumar, 2017). Innovation gives a competitive advantage over other organisations and facilitates sustainable growth as a result of continuous improvement (Leal-Rodríguez, Eldridge, Roldán, Leal-Millán, & Ortega-Gutiérrez, 2015). Adopting innovation becomes critical to solve problems and deliver beneficial community-based outcomes (Arundel et al., 2019).

For innovation to happen a supportive organisational culture is inevitable (Krishnakumar, 2017; Raadschelders, 2009). McDonald (2008) differentiated between being an innovative organisation and just being an organisation where innovative things happen. To become an innovative organisation, an innovation culture is required. Innovation culture is a vital element that makes an organisation truly innovative because of its role in developing an environment where innovative ideas are much more likely to be implemented regularly (Vander Steen, 2009). A strong innovation culture can be developed through strong support by the leaders and top management of an organisation and employing several initiatives such as providing a reward system that can encourage innovative ideas and discretion (Borins, 2001).

As discussed earlier, many studies on innovation had been conducted in the private sector (Gallouj & Zanfei, 2013) with few in the public sector. Studies have reported that the innovation processes between public and private services are the same (Djellal, Gallouj & Miles, 2013; Hartley, 2005) with some distinctive differences (Hartley, 2005). According to Moore (2005), public organisations have various objectives, purposes, responsibilities, chains for implementation, institutional cultures, and a strong degree of formal procedures that provide different conditions for innovation management. Therefore, to establish an innovation culture and encourage innovation abilities in public organisations, administrative and political support is essential (Hartley, 2011; Moore, 2005). Furthermore, Eggers and Singh (2009) pointed out that the problem with innovation in public organisations is not limited to only the absence of innovation but that innovations are casual and driven by accidental circumstances. Moreover, according to Sorensen and Torfing (2011), public organisations are commonly linked with bureaucratic silos, stalemate, inertia, and a shortage of dynamic and innovative environment as well as being inhospitable to innovation. They recommended public organisations to adopt the principles of strategic management, privatisation, outsourcing, and deregulation to be innovative. Also, Sorensen and Torfing (2011) argued that despite the increasing interest in encouraging public innovation, the sources of such innovation are not well understood.

However, despite the problems of innovation in public organisations, there are successful examples (Mulgan & Albury 2003; Windrum & Koch 2008). For instance, Djellal et al. (2013) indicated that the processes of creative ideas are many and varied in public service organisations. Informal non-linear innovation processes are popular in the public sector (Djellal et al., 2013; Gallouj & Zanfei, 2013). Recently, concentration has also increased on employees as a source of innovations in public

organisations (Fuglsang & Sorensen, 2011; Moore, 2005). Studies also highlighted the importance of user involvement in the service innovation processes in the public sector (Donetto, Pierri, Tsianakas, & Robert, 2015).

In summary, the endeavour of leaders and managers of the public sector to facilitate collaboration and stimulate innovation needs to be complemented with constant attempts to establish an innovation culture (Dobni, 2008). To do so, it is important to combat detailed regulations and rules and the demotivating performance measurement systems that handicap innovation (Sorensen & Torfing, 2013). Creating a flexible organisation with a clear vision and border is also necessary to achieve organisational targets and success (Sorensen & Torfing, 2013).

## **2.7.6 The Relationship between Innovation Culture and Organizational Performance**

### **2.7.6.1 Organizational Culture and Organizational Performance**

Organisations aim to achieve a high level of employee commitment in order to achieve several objectives such as increased productivity (Shahzad, Luqman, Khan & Shabbir, 2012) and job satisfaction (Kotter, 2012). The management of an organisation is responsible for establishing an organisational culture toward this purpose (Shahzad et al., 2012). According to Schein (2010), an organisational culture represents shared values and beliefs of employees, which affect the organisation.

Past studies have demonstrated the positive influence of organisational culture on organisational performance (Bulach, Lunenburg, & Porter 2012; Denison, 1990; Kopelman, Brief, & Guzzo, 1990; Kotter, 2012; Naranjo-Valencia et al., 2016; Ng'ang'a & Nyongesa, 2012; Saad & Abbas, 2019; Sorensen, 2002). However, such

an effect is realised if the organisation capable of adapting to environmental changes (Azhar, 2003; Rose, Kumar, Abdullah & Ling, 2008). Furthermore, organisational performance could be adversely affected when the culture is so strong that it produces resistance to change, implementing an organisational strategy challenging (Pearce & Robinson, 2004). They also argued that the existence of subcultures in the organisation could weaken the organisational performance.

Due to the difficulty in operationalising the culture construct, organisational unique practices and strategies that contribute to the attainment of organisational excellence (Lu, Betts & Croom, 2011) are difficult to ascertain. Furthermore, some studies employed a small sample size and limited number of variables (Antony & Bhattacharyya, 2010), which were likely to contribute to the different magnitude of the correlation coefficients in prior studies. Therefore, more research to recognise the nature and ability of culture in impacting organisational performance (Ahmed & Shafiq, 2014) and public innovation (Saad, & Abbas, 2019) is needed.

#### **2.7.6.2 Innovation Culture and Organizational Performance**

There has been a considerable deal of interest among practitioners and academics in innovation in organisations and particularly the impact of innovation culture on organisational performance (Akbari & Monzavi, 2015; Cable, 2010; Dobni, 2008; Kasraei, Shami, Nazeri & Zadsaleh, 2015; Pharaon & Burns, 2010). Innovation is one of the fundamental factors that affect performance and lead to competitive advantage (Leal-Rodríguez et al., 2015) whereby generating new products, services and processes are critical for the organisation to confront its rivals (Porter & Stern, 2001). Innovation has also been found to increase organisational profit, growth, market share

(Galindo & Méndez, 2014; Kung & Schmid, 2015; Deshpande, Farley & Webster, 1993), return on assets (Ndicu, 2018; Salavou, 2002), sales growth (Choi & Williams, 2014), and employment growth (Vivarelli, 2014). Besides, innovation can improve brand perception among customers and differentiate the brand on the market (Martinde Castro, Delgado-Verde, Navas-Lopez, & Cruz-Gonzalez, 2013; Tellis, Prabhu, & Chandy, 2009). Indeed, an extensive review of the literature suggests a positive relationship between innovation and organisational performance (Damanpour & Gopalakrishnan, 2001; Damanpour, Walker & Avellaneda, 2009; Hult, Hurley & Knight, 2004; Jimenez-Jimenez & Sanz-Valle, 2011; Karabulut, 2015; Naranjo-Valencia et al., 2016; Rosenbusch et al., 2011; Rosli & Sidek, 2013; Salim & Sulaiman, 2011; Stock & Zacharias, 2011; Walker, 2004; Weinzimmer, Michel & Franczak, 2011) (see Appendix B-4).

However, there is still a shortage of empirical investigations that examine the direct association between aspects of innovation and different dimensions of organisational performance (Gunday et al., 2011; Hashi & Stojcic, 2010; Rosenbusch et al., 2011; Sadikoglu & Zehir, 2010). Furthermore, many authors proposed future research to be conducted to confirm earlier results where most studies were carried out in the manufacturing context (Evangelista & Vezzani, 2010; Gunday et al., 2011; Yuan et al., 2010). Furthermore, there is limited empirical evidence in the public sector, specifically, in police departments.

In term of innovation culture, Xerri and Brunetto (2011) contended that management coordination is necessary for building and improving control structures to motivate employees to disseminate knowledge and develop trust and cooperation with other employees. Buschgens et al. (2013) proposed a clan control system to reinforce

performance resulting from innovation. Such a clan control system starts from the proposition that all members of a clan share the same value and beliefs, making up a culture accepted and divided by the entire group. Salvato (2009) stated that the link between organisational culture and innovation processes are made up by the ability of individuals to innovate and the activities of management directed to stimulate innovation in individuals and organisational objectives. Innovation culture can also be encouraged through the socialisation of the workplace (Xerri & Brunetto, 2011).

Innovation capability will allow an organisation to respond to environmental changes effectively, resulting in an enhanced competitive advantage and boosting organisational performance (Barney, 1986; Calantone et al., 2002; Zaltman et al., 1973). It is argued that innovation culture can support innovative behaviour of organisational members to generate new ideas (Deshpande et al., 1993; Kleinschmidt, De Brentani & Salomo, 2007), leading to improved performance (Claver et al., 1998; Isaksen & Akkermans, 2011; O’Cass & Ngo, 2007). The characteristics of innovation culture such as participation, professional development, cooperation and support, and power-sharing have been shown to affect the innovation rate of an organisation significantly (Hurley, 1995).

The literature indicates that innovation culture and organisational performance are positively and significantly linked (Anderson et al., 2012; De Brentani, 2001; De Brentani & Kleinschmidt, 2004; Kuo & Tsai, 2017; Lee et al., 2017a; Rosenbusch et al., 2011; Salim & Sulaiman, 2011; Stock et al., 2013; Wei et al., 2012; Zhang & Huang, 2010). However, more studies are recommended to add to the existing literature to confirm past findings (Evangelista & Vezzani, 2010; Gunday et al., 2011; Yuan et al., 2010). Furthermore, since there are limited studies on innovation in the

Middle East (Farouk et al., 2016), in the public sector in general (Arundel et al., 2016; Van Acker & Bouckaert, 2017) and police agency in particular, and because the adoption of innovation in public organisations is still in the early stage (Ham et al., 2015), more studies are needed. Also, some researchers suggested further investigations to study the influence of innovation culture on the dimensions of organisational performance.

### **2.7.7 The Relationship between Six Sigma and Innovation Culture**

Many discussions have been conducted concerning Six Sigma and its role in enhancing innovation. Several scholars asserted that Six Sigma works as an incentive for innovation (Antony et al., 2016b; Byrne, Lubowe, & Blitz, 2007). Antony et al. (2016b) mentioned that Six Sigma assists an organisation in making a breakthrough in innovations that fulfil far-reaching improvements in its organisational performance. It also permits organisations to construct an organisational climate where innovation has been expected (Byrne et al., 2007). Similarly, Jacobs et al. (2015) described Six Sigma as an administrative innovation. This is because it provides tools to create systematic innovation in an organised way (Eng, 2011), which therefore contributes to enhancing organisational performance (Chiarini, 2013; Khaidir et al., 2013; Gunawan & Karimah, 2017).

According to Creveling, Hambleton, and McCarthy (2006), three common principles Six Sigma share with quality: continuous improvement, focusing on the customer, and teamwork. However, it also emphasises innovation. The role of Six Sigma toward customer orientation can assist organisations in giving more focus on incremental innovation in meeting customer needs (Santos-Vijande & González-Alvarez, 2007).

According to Christensen (2002), innovation does not occur randomly; its results only manifest in that way because we do not understand all related factors that impact successful innovation such as the strategies of the management, resources, capabilities and the degree of organisation integration. Therefore, the ability to employ Six Sigma to master these variables, services, processes, and products generated will have more predictable outcomes (Sony & Naik, 2012). Similarly, Six Sigma facilitates to find customer requirements and the process capability (Sauer, 2001) and eliminate non-value work and problems, thereby shortening the innovation process (Sony & Naik, 2012). Moreover, continual improvement programmes can motivate members of the organisation to evaluate how tasks are organised and performed creatively (Prajogo & Sohal, 2003). Additionally, Six Sigma drives to corporate culture change, achieving superior quality and improvement (Erwin & Douglas, 2000).

The literature points out that continuous improvement methodologies reinforce innovation culture where employees are interested to learn and enhance team building, building a reliable work environment (Eriksson & Garvare, 2005). However, such a culture that supports and encourages innovation in an organisation is subtle and complicated. Byrne et al. (2007) analysed the performance of innovation of many organisations that had adopted Six Sigma. They found that the most successful organisations were those that had intentionally included the principles of Six Sigma into their innovation programme and had employed it to enable breakthrough innovations and change the culture towards one that supported continual innovation. Additionally, Zu et al. (2010) examined the impact of different types of organisational culture on the implementation of Six Sigma and TQM by surveying 226 US manufacturing plants. They found the differential impacts of culture on Six Sigma and TQM implementation. They suggested that the implementation Six Sigma and TQM

first require organisational cultural values to be taken into. Knapp (2015) also reported the significant role of culture in Six Sigma implementation where a culture of cohesion and flexibility improved the successful implementation of the quality initiative. Davison and Al-Shaghana (2007) investigated the factors that impact on the quality culture development in 15 different types of organisations. The study concluded that Six Sigma organisations scored higher in the tested elements than other organisations without Six Sigma.

Scholars emphasise the importance of compatibility between organisational culture and any new practice (Ansari, Fiss, & Zajac, 2010) where a low cultural fit is likely to slow the implementation of such a practice (Love & Cebon, 2008). At times, an organisation may deliberately impose implementation on its employees with little or no adaptation, leading to failure as in the case of 3M (Canato, et al. 2013). When such a situation happens, employees tend to feel tense, leading them to resist the forced implementation (Kirkman & Shapiro, 2001). Hence, creating a supportive culture is essential for implementing Six Sigma effectively (Antony & Banuelas, 2002; Cheng, 2007; Gunawan & Karimah, 2017; Kwak & Anbari, 2004; Mustafa & Jamaluddin, 2017).

Many organisations have adopted Six Sigma to develop and improve innovation and excellence in quality standards (Eng, 2011). However, the role of Six Sigma in enhancing organisational innovativeness does not receive adequate empirical attention because of a lack of theoretical development and analysis of Six Sigma and because it tends to be perceived as a practitioner-oriented and prescriptive tool used in consulting works (Eng, 2011). There is also a shortage of theoretical concepts to clarify the variation between successful and unsuccessful efforts (Antony, Antony, Kumar &

Cho, 2007; Dean & Bowen, 1994). Also, there are also limited studies on the influence of Six Sigma on culture (Schroeder et al., 2008; Zu et al., 2010) despite the significance of organisational culture in the successful implementation of Six Sigma (Antony, 2004b; Goffnett, 2004). Therefore, further research is needed to investigate the connection between Six Sigma and innovation culture as an approach for improving organisational performance and attaining competitive advantages (Azis & Osada, 2010; Shafer & Moeller, 2012; Sony & Naik, 2012), assess the internal fit between organisational culture and the implementation of Six Sigma, and explore which organisations can successfully employ Six Sigma and identify the required changes in culture and structure (Schroeder et al., 2008).

### **2.7.8 The Relationship between Kaizen and Innovation Culture**

In recent years, numerous investigations on the success of transferring Kaizen from a Japanese culture to other cultures such as the US (Kenney & Florida, 1993), UK (Oliver & Wilkinson, 1992; Saka, 2004) and Hong Kong (Anh, Jing, & Matsui, 2011; Aoki, 2008; Hong, Easterby-Smith & Snell, 2006; Taylor, 1999) had been conducted. However, the results of these studies were conflicted. While some studies deduced that Kaizen was successfully transferred (Boyer, Charron, Jurgens, & Tolliday, 1998), others stated otherwise (Fukuda, 2010; Kono, 1982; White & Trevor, 1983). The reason could be due to the differences in culture and work ethics. Some emphasise that Kaizen is highly dependent on organisational culture (Rad, 2006; Recht & Wilderom, 1998; Tomic et al., 2017).

Kaizen is a practical approach to change work experience, work proceeding, and work culture (Hashim, Zubir, Conding, & Jaya, 2012b). It can help make the organisation's operations become more success by eliminating wastes and removing non-adding

value activities (Venkataiah & Sagi, 2012). It represents the efforts of organisational members in the improvement processes (Mishra & Gupta, 2010), thereby creating an organisational culture (Mishra & Gupta, 2010). The culture is created when members share the same value, symbols, habits, objectives, etc. (Schein, 1983). In this regard, creating a Kaizen culture occurs when small, incremental and steady changes occur in the organisation (Mishra & Gupta, 2010). Anand et al. (2009) and Brunet and New (2003) stated that a Kaizen and culture could assist in enhancing efforts toward sustainable improvement efforts.

Creating an appropriate culture is very important if an organisation intends to implement Kaizen properly. Pakdil and Leonard (2015) pointed out that the implementation of Kaizen in the west has broadly failed because of the lack of understanding the dimensions of culture that are aligned with the Kaizen processes as well as the duality in Kaizen processes between the need for innovation and the need for control.

According to Yasar et al. (2017), and Satsomboon and Pruetipibultham (2014), Kaizen has a positive impact on innovation. Many researchers have focused on the significance of innovation through the Kaizen processes to attain the desired benefits or address some issues (Childe, Maull, & Bennet, 1994; Habidin, Hashim, Fuzi, & Salleh, 2018; Harrington, 1995; Imai, 1986; 1997; Jackson & Sloane, 2003; MacDonald, 1995; McKay & Radnor, 1998; Ohno, 2007; Ozdemir & Mecikoglu, 2016; Sweeney & Business, 2017). Imai (1997) emphasised that the innovation process should always be linked directly to Kaizen. Kaizen involving the innovation process aims to increase the efficiency of tasks (Anand et al., 2009), which enhances continuous innovation (Boer & Gertsen, 2003). Studies also stated that innovative

activities such as Kaizen include the processes of problem-solving and decision-making (Fujimoto, 1999; Myers & Marquis 1969; Thompson 1965). Leaders and workers are both involved in problem-solving and decision-making activities in Kaizen, and they are significant contributors to Kaizen as incremental process innovations (Bhuiyan & Baghel 2005; Imai 1986; Lindberg & Berger, 1997).

While the significance of Kaizen has been explored, past studies did not explore the role of Kaizen in innovation (Bessant & Caffyn, 1997; Boer & Gertsen, 2003; Choi, 1995; Habidin et al., 2018; Suarez-Barraza & Smith, 2014). Hence, a study that examines this issue is justified.

### **2.7.9 The Relationship between Benchmarking and Innovation Culture**

According to Zminda (2012), the process of innovation is the result of interaction and learning by trial and error and the accumulation of specific and interdisciplinary knowledge. This way of learning and gathering information is identical to the method of benchmarking (Gierczak-Korzeniowska & Gołembski, 2017). Benchmarking is a methodical and continuous process of exploration, measurement and implementation of best practices (Guthrie & Seybert, 2017; McAteer & Stephens, 2013). In benchmarking, the most imperative business processes in the organisation are compared with the best-in-class processes with the purpose of gaining information in order to use or adapt the best solution (Dembowski, 2013; Gierczak-Korzeniowska & Gołembski, 2017). This is to permit for the improvement of performance of the organisation in terms of its processes, services, and products to the level gained by the model organisations (Alosani et al., 2016; Al-Tarawneh, 2014; Twaissi & Alhelalat, 2015).

Benchmarking is also an independent management approach that combines a group of quality tools and techniques (Del Giorgio Solfa, 2012) and a method of management innovation (Clemente & Balmaseda, 2010). Benchmarking can play a major role in identifying the best practices, structures and procedures with respect to innovation (Radnor & Robinson, 2000). Knowledge collected and developed within the organisation and gained from the market in the process of benchmarking simplifies the making and implementation of innovation (Gierczak-Korzeniowska & Gołembski, 2017). In turn, the reproducibility and methodical analysis of benchmarking foster an innovation culture (Gierczak-Korzeniowska & Gołembski, 2017).

Intangible assets such as knowledge, information, experience, and the ability to learn quickly play a crucial part in both the benchmarking analysis and the building of an innovation culture of an organisation (Gierczak-Korzeniowska & Gołembski, 2017). Ferraresi, Quandt, dos Santos, and Frega (2012) mentioned the importance of these elements for innovation. They associated innovation with the process of transforming knowledge into the value of a new or perfected solution. Benchmarking as a method aspires to search for patterns and triggers fast learning from others, creating new standards of benefits (Simatupang & Sridharan, 2004). To paraphrase Roffeei, Kamarulzaman, and Yusop (2016), it can be said that innovation culture creates some conditions that enhance learning in the organisation. This matter represents a perfect prelude to the construction of an innovation culture, which is the organisation's most valuable and intangible asset (Gierczak-Korzeniowska & Gołembski, 2017).

With the importance of benchmarking for organisations to conduct the required improvements, it is vital to focus on organisational culture in the business domain (Al-Majali, 2017; Salem, 2003; Williams et al., 2012) to avoid the impacts of

implementation barriers (Williams et al., 2012). This culture should focus on continuous improvement, quality communication, organisational values (Zairi & Whymark, 2000) and innovation (Norek, 2012; Tellis et al., 2009). A culture based on innovation is a basis for innovative behaviours of employees which can support the organisation's renewal and the process of innovation and organisational performance (Hogan & Coote, 2014).

According to Hogan and Coote (2014), innovation is a prerequisite for success particularly in increasingly competitive and dynamic markets (Hogan & Coote, 2014). Thus, benchmarking can reinforce innovation and improve the quality of product and service (Radnor & Robinson, 2000). It provides insight into an innovation process, and by benchmarking with other organisations, the innovation's processes and practices may be able to help the organisation advance in an ever-more competitive marketplace (Radnor & Robinson, 2000). Moreover, the benefit of benchmarking is an innovation by integrating new ideas with other ideas derived from other practices (Del Giorgio Solfa, 2012).

Many studies have demonstrated the impact of benchmarking on innovation culture (Gierczak-Korzeniowska, & Gołembski, 2017; Hodgson, Farrell, & Connolly, 2007) by managing and encouraging innovation (Clemente & Balmaseda, 2010; Norek, 2012; Tellis et al., 2009), and promoting the evolution of a learning culture in the organisation (Al-Majali, 2017; Moraru & Grecu, 2015; Mungai, 2016), which contributes to improved performance and competitive advantage (Alosani et al., 2016; Attiany, 2014; Moraru & Grecu, 2015)..

### **2.7.10 The Rationality of the Expected Mediating Effect of Innovation Culture in the Relationship between Six Sigma, Kaizen, Benchmarking, and Organizational Performance**

As mentioned previously, innovation is a strategy for long-term survival and success (Anderson, Potočnik & Zhou, 2014; Palazzeschi, Bucci & Di Fabio, 2018). It can contribute to building competitive advantages in a challenging, competitive, and changing market (Lukes & Stephan, 2017; Palazzeschi et al., 2018). This is because innovation enhances and encourages the adoption of new ideas or behaviour (Harkema, 2003; Lukes & Stephan, 2017) and can only be performed when an organisation applies this process to its business practices (Sharifirad & Ataei, 2012). However, it is difficult to adopt and practise innovation without having an appropriate culture that promotes the organisation to innovate. As such, innovation culture is a critical factor, an organisation needs in its daily business activities (Halim et al., 2015). Scholars have mentioned that continuous improvement tools (Elias & Davis, 2018) with innovative capabilities (Keiser & Koch, 2008) can assist organisations in accomplishing the required results (Elias & Davis, 2018; Singh & Singh, 2012; Taniguchi & Onosato, 2018). These continuous improvement tools rely on innovation in search of finding new ideas for ongoing operations (Pande et al., 2002). Therefore, the culture of an organisation embedded with innovation activities will contribute to improving performance and profitability (Cameron & Quinn, 1999; Dobni & Klassen, 2018), and help the organisation to continuously improve and do things better (Detert, Schroeder & Mauriel, 2000). Such innovative organisations tend to inspire their leaders to conduct new improvement initiatives and provide the needed resources to carry out the initiatives (Maroofi, Nazaripour, & Maaznezhad, 2012) to meet the changing needs and requirements of customers (Yeung, Brockbank, & Ulrich, 1991).

Successful implementation of continuous improvement programmes relies much on an appropriate culture (Barrett, 1995; Bessant, Caffyn, Gilbert, Harding, & Webb, 1994; Blumenthal & Kilo, 1998; Morgan & Liker, 2006; Verona & Ravasi, 2003). Bessant et al. (1994) maintained, however, that continuous improvement does not always achieve the desired success and is particularly difficult to sustain in the long-term. Therefore, they stressed the need to create an organisational culture that promotes innovation and improvement. Similarly, Fryer et al. (2007) stated that successful implementation of continuous improvement programmes is influenced by many factors such as the organisation's background, structure, and culture. Thus, it is essential to create and sustain a culture for the success of continuous improvement initiatives (Barrett, 1995; Verona & Ravasi, 2003) by encouraging employees to generate ideas and suggest regular changes (Sitkin, Sutcliffe & Schroeder, 1994; Upton, 1996).

Many studies have demonstrated the role of culture on the implementation of continuous improvement tools, including Six Sigma (Davison & Al-Shaghana, 2007; Knapp, 2015; Zu et al., 2010), Kaizen (Atkinson, 2010; Badurdeen, Marksberry, Hall, & Gregory, 2009; Imai, 1986; Kaplinsky, 1995; Rad, 2006; Recht & Wilderom, 1998; Tomic et al., 2017; Venkataiah & Sagi, 2012), and benchmarking (Kyriakidou & Gore, 2005; Salem, 2003; Zairi & Whymark, 2000). However, there is a shortage of studies that investigated the role of innovation culture in Six Sigma (Zu et al., 2010) and Kaizen (Glover et al., 2015; Hook & Stehn, 2008) despite the significance of innovation culture in the effective implementation of these continuous improvement tools (Antony, 2004b; Goffnett, 2004). When an organisational culture could develop employees' ability to innovate, the organisational culture can be described as an innovation culture (Menzel, Aaltio, & Ulijn, 2007). Such culture constitutes a vital

organisational factor that promotes the knowledge base of the organisation (Martin-de Castro et al., 2013). For that, many studies have employed innovation culture as a mediator to investigate the relationship between various variables (Ahmad, Ramayah, Halim & Rahman, 2017; Halim et al., 2015; Hanifah, Halim, Ahmad, & Vafaei-Zadeh, 2017; Martin-de Castro et al., 2013; Maroofi, Mahdiun, & Taghsimi, 2016; Popa, Soto-Acosta, & Martinez-Conesa, 2017; Roffeei, Yusop, & Kamarulzaman, 2018). Due to inconsistent results, this study considered innovation culture as a mediator between continuous improvement tools and organisational performance.

## **2.8 Underpinning Theories**

Reviewing the literature revealed two related theories to explain the conceptual framework of the research. They are systems theory and the resource-based view theory (RBV).

### **2.8.1 Systems Theory**

Quality thinking is anchored on understanding a system (Deming, 1986). A system is made up of elements which are interdependent within a specific network, working together to accomplish the purpose of the system (Houston, 2008; Teece, 2018). According to Robbins and Barnwell (2002), there are two kinds of systems: closed or open. A closed system does not receive energy from outside sources and does not release the energy to the environments. This kind of system has little applicability to the study of organisations (Robbins & Barnwell, 2002). However, an open system realises the dynamic interaction of a system with its environment (Robbins & Barnwell, 2002; Teece, 2018). All organisations interact with their environment, but

the extent to which they do so varies (Stoner, Freeman, & Gilbert Jr., 1995; Teece, 2018).

As a system (Houston, 2008; Teece, 2018), an organisation requires a set of input from the external environment such as labour and materials, which are then transformed to services or products and then delivered back to the external environment as a final output (Houston, 2008). This process reflects the systems theory. The whole process happens continuously in a cycle as illustrated in Figure 2.6.

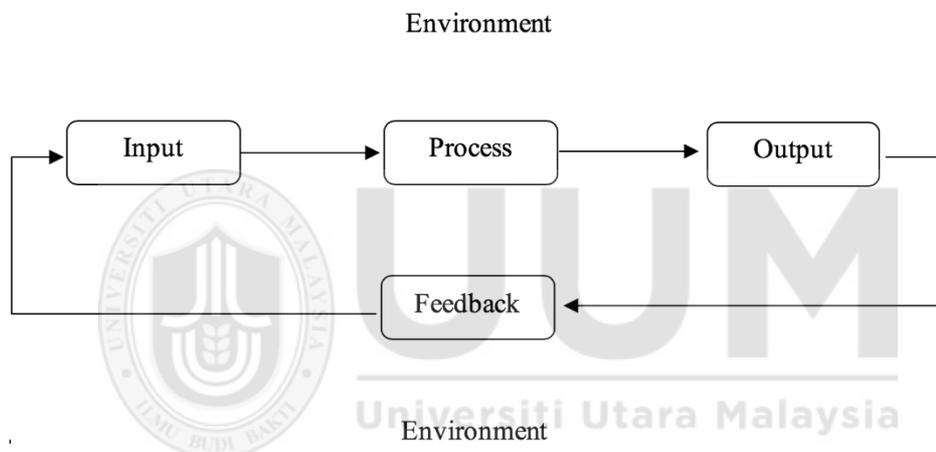


Figure 2.6  
*Model of Systems Theory*  
Source: Robbins and Barnwell (2002)

In this research, the implementation of the continuous improvement tools is considered one of the organisational efforts to improve its internal processes of the organisation to increase its performance. Therefore, systems theory seems suitable to underpin the present research. A system approach evaluates the effectiveness of an organisation by its capability to obtain inputs, handling the input by certain processes, deliver the outputs, and ensure balance and stability (Robbins & Barnwell, 2002; Teece, 2018). The police agencies can be perceived as a system utilising resources to convert inputs

into outputs. Improvement in the police agencies includes continuous improvement tools as inputs, processes, and outputs as illustrated in Figure 2.7.

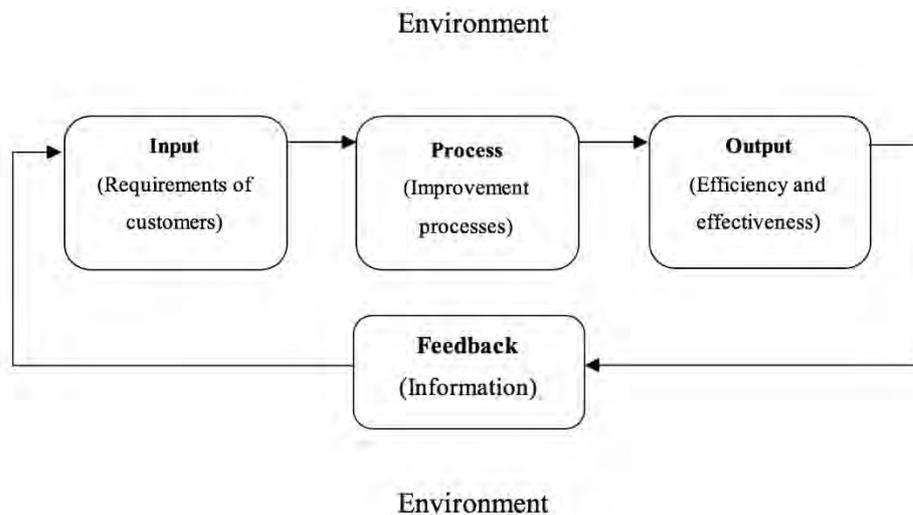


Figure 2.7  
*Dubai Police as a System*

The systems theory approach to police agencies contains inputs, processes, and outputs, and all are related to the environment. The inputs come to the system from the environment and then are sent back by some processes as outputs to the environment. In this research, the input includes customer requirements, employees, and management. The process stage consists of process improvement, planning, organising, motivating, and controlling. The output phase consists of effectiveness, cost saving, customer satisfaction, etc. Finally, the feedback stage consists of information about the system from a suggestion system, complains of customers and employees, and performance reports. The feedback obtained could be used to amend the system while the process is still in progress, making the system more flexible and responsive to the environment.

Systems theory was chosen because it directly informs that the improvement is based on Deming's "Appreciation for a System" where an understanding of how all parts fit together in a process or organisation is vital to understand improvement (Teece, 2018). The theory also offers the arguments that designing an effective business system leads to high performance and supports the thought of contemporary management (Oakland, 2003). It also provides an appropriate framework for the study of innovation in organisations (Read, 2000). In other words, the theory enhances the role of managers in designing an effective business system anchored on an effective process.

Overall, systems theory offers a useful analytical framework to understand an organisation from a general perspective, enabling descriptions and explanations to be formed of the organisation's behaviour (Teece, 2018). Further, systems theory has a long and significant history in the study of management practice (Emery & Trist, 1965), in particular when research is focused on 'services' of social policies and sociotechnical phenomena (Emery & Trist, 1973). The systems theory was selected as the foundation for this thesis because of its utility and significant academic history of improvement practices within the police systems.

### **2.8.2 Resource-Based View Theory**

The initial idea of the resource-based view theory (RBV) was first developed by Penrose (1959), and today it is a broadly proposed framework for interpreting how firms fulfil sustainable competitive advantage (Barney, 1991; Grant, 1991; Gupta, Tan, Ee, & Phang, 2018; Pralhad & Hamel, 1990). The RBV is based on an internal point of view of the firm to clarify variation in performance of the firm. The primary argument is that firms can get benefit from having unique resources that assist them in gaining and attaining a sustainable competitive advantage.

An accurate understanding of RBV theory requires defining “resources” of the firm. Wade and Hulland (2004, p.109) defined them as “assets and capabilities that are available and useful in detecting and responding to market opportunities or threats”. Srivastava, Shervani and Fahey (1998) stated that assets could be considered inputs to processes or outputs of a process, while capabilities can convert inputs into outputs of maximal worth (Wade & Hulland, 2004). In other words, assets of the firm are anything tangible or intangible that can be employed for generating, producing and delivering products and services to the market while capabilities are repeatable types of actions in the utilisation of assets to generate, produce and deliver products and services to the market (Sanchez, Heene, & Thomas, 1996). Additionally, according to Amit and Schoemaker (1993), capabilities refer to the capacity of an organisation to deploy resources by utilising organisational processes to achieve the required results. Such capabilities include tangible or intangible processes and information-based. Amit and Schoemaker (1993) pointed out that an organisation’s capabilities can be considered ‘intermediate goods’ created by the organisation to provide protection and strategic flexibility for its final service and product and reinforce productivity of its resources. Intangible resources include knowledge and information, social and culture, reputational assets, the skill of individuals and trademark. Such intangible resources are considered the essential elements for sustaining competitive advantage due to their nature where they are difficult to imitate or copy (Oliver, 1997).

Studies have applied RBV in the adoption of continuous improvement strategies. For example, Gowen and Tallon (2005) concluded that the resources that led to accomplishing the expected outcomes in implementing Six-Sigma include human, organisational, financial and physical resources. Such resources also linked to the dimensions of sustainable competitive advantage (Sony, 2019). Llorens-Montes and

Molina (2006) investigated the correlation between RBV and Six Sigma. They demonstrated that for effective Six Sigma implementation appropriate resources such as improvement efforts, project teamwork, training and information should be provided. Similarly, Kiatcharoenpol, Ruekkasaem, Prajogo, and Laosirihongthong (2011) argued that adequate resources are necessary for the implementation of Six Sigma and remarked that implement Six Sigma in small-to-medium sized companies is not appropriate because of limited resources such companies have.

In the context of continuous improvement, dynamic capabilities are used to clarify how continuous improvement culture supports sustainability after implementing continuous improvement tools. A Kaizen culture as a dynamic capability provides inclusive infrastructure to enable an organisation to organise and use its resources for improvement projects and achieve sustainable outcomes (Anand et al. 2009; Bessant & Francis 1999; Bessant, Caffyn, & Gallagher, 2001; Oxtoby, McGuinness & Morgan, 2002; Teece & Pisano, 1994). Zailani et al. (2015) stated that one of the most important competitive resources of the firms includes capabilities in terms of quality, productivity, and delivery time. Further, one of the crucial factors of stability in organisations is organisational routines (Gong, Baker, & Miner, 2006), which provide continuity (Becker, 2004), efficiency (Argote, 1999), and predictability in an active organisational life (Cohen et al., 1996). These routines play a vital function by decreasing variability in organisational behaviour (Becker, 2004).

Benchmarking is a market-based learning process which allows a firm to search and adopt the best practices to promote its competitive advantage (Mittelstaedt, 1992). Over time, the initial concentration of benchmarking shifted from products or services, pursuing strategies and outcomes of performance accomplished by best-in-class firms,

to processes that focus on the capabilities that have created the outstanding performance (Ralston, Wright, & Kumar, 2001). Therefore, benchmarking can become a principal learning tool for determining, constructing, and reinforcing capabilities of marketing to provide a sustainable competitive advantage (Vorhies & Morgan, 2005). To the extent that benchmarking is continuous, has a capacity of learning, which is scarce, worthy, nonsubstitutable and inimitable, improvements that rely on benchmarking in the stock of firm's marketing capabilities can represent a source sustainable competitive advantage (Dickson, 1992).

In terms of innovation, several scholars focused on RBV theory (Galende, 2006) as the theoretical framework to understand innovation (De Brentani, Kleinschmidt & Salomo, 2010; Todtling, Lehner & Kaufmann, 2009). The RBV postulates that resources and capabilities of a firm are the fundamental determinants of competitive advantage. Innovation capabilities are a part of organisational capabilities that concern the ability of a firm to innovate. Assink (2006) defined innovation capabilities as “the internal driving energy to generate and explore radical, new ideas and concepts, to experiment with solutions for potential opportunity patterns detected in the market’s white space, and to develop them into marketable and effective innovation” (p. 219). Innovation capabilities of a firm, therefore, concern the ability to discover, test and develop ideas into new concepts or products.

Hence, the RBV theory is suitable in which to frame this study, which analysed the role of a firm's intangible resources and capabilities to accomplish a competitive advantage of the organisation through innovation. Various studies have employed RBV in this manner as innovation is a substantial source of competitive advantage (Vaccaro, Parente, & Veloso, 2010). Furthermore, the interaction between resources

plays a primary role in fulfilling a competitive advantage (Martin-de Castro et al., 2013). Notably, the goal of this research was to investigate the impact of continuous improvement tools on organisational performance. The constructs of this research were underpinned theoretically by the RBV theory based on the extensive review of the literature. Finally, both the RBV and continuous improvement tools emphasise efficiency, waste, and customer value (Peteraf & Barney, 2003). The RBV postulates that outstanding structures and systems enable firms to develop excellent and higher quality products or services at lower costs (Teece, Pisano & Shuen, 1997), and the implementation of continuous improvement tools assists to enhance quality and decrease cost, leading to the competitiveness of firms.

## **2.9 Summary**

The literature on organisational performance is abundant, but how and what mechanism is likely to lead to performance still need more researching. This study proposed innovation culture as a mechanism to improve organisational performance. Based on a comprehensive review of Six Sigma, Kaizen, benchmarking, and innovation culture, several conclusions can be made as follows.

Firstly, there is a bulk of studies that have been examined the impact of Six Sigma on organisational performance. However, most of these studies conducted in developed countries, and neglected public sector organisations. Secondly, on the impact of Kaizen on performance, there is still some ambiguity in the relationship, especially in public sector organisations. Moreover, while some studies found that Kaizen improved organisational performance, others did not. Such inconsistency of the findings raises the need to investigate further the factors that can lead to the successful implementation of Kaizen. Thirdly, there is a growing body of literature examining

benchmarking and its impact on organisational performance, but little attention is given to investigate this relationship in the public sector. Fourthly, few investigations have focused on the link between innovation culture and organisational performance, especially in the public sector. This study examined innovation culture and its role as a mediator between Six Sigma, Kaizen, benchmarking, and organisational performance. The contradiction in the relationship between these variables and organisational performance could be explained better if innovation culture is considered.

Fifthly, continuous improvement, being a quality philosophy system, has been anchored with system theory and resource-based view (RBV) theory. The argument surrounding continuous improvement and RBV is that for organisations to be competitive, they have to use resources and capability cost-effectively because the resources are limited (Attaran & Attaran, 2004). The system theory provides a framework to understand that continuous improvement is needed for organisations to perform because they have to align themselves with the changing environment. Finally, the theoretical framework and hypotheses of this research were drawn based on the reviewed literature.

## **CHAPTER THREE**

### **RESEARCH MODEL AND HYPOTHESES DEVELOPMENT**

#### **3.1 Introduction**

This chapter reviews the model of this study and discusses the connections among all the variables: organisational performance, Six Sigma, Kaizen, benchmarking, and innovation culture. In addition, the chapter also explains information on the theoretical and practical gaps of the study, while it finally presents the hypotheses that shall be tested in order to establish the relationship among all the variables of this study.

#### **3.2 Research Model of the Study**

Based on the extensive literature review in the previous chapter, the model of this study is illustrated in Figure 3.1. The variables are classified into two: the independent (exogenous) and dependent (endogenous) variables. The exogenous variables are not impacted by other variables the while endogenous variables are impacted by the exogenous variables and sometimes may affect other variables at the same time (Schreiber, Nora, Stage, Barlow & King, 2006). The exogenous variables in the research model are Six Sigma, Kaizen, and benchmarking, whereas the endogenous variables are organisational performance and innovation culture.

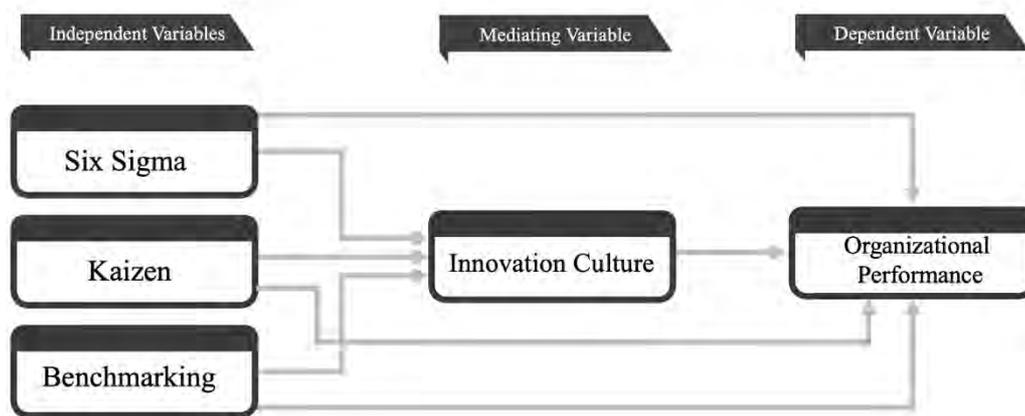


Figure 3.1  
*Research Model*

The hypothesised relationship was based on systems theory that suggests that the components of an organisation are not isolated, and they interact with each other. The interaction between the continuous improvement tools and innovation culture will have a positive effect on the overall performance. RBV was also employed, which suggests that firms could accomplish superior performance by using the resources and capabilities effectively.

### 3.3 Hypotheses Development

The following discusses the research hypotheses development.

#### 3.3.1 Six Sigma and Organizational Performance

Six Sigma is a systematic and structured method for organisational improvement (Choo et al., 2007; Linderman et al., 2006; Oruako, 2014). Salah et al. (2010) asserted that Six Sigma could help organisations to eliminate defects from the process, resulting in enhanced profitability, increased customer satisfaction, and improved business excellence (Albeanu & Hunter, 2017; Shafer & Moeller, 2012; Tiwari et al., 2008). Six Sigma also has a vital role in improving organisational performance (Chiarini,

2013; Khaidir et al., 2013; Gunawan & Karimah, 2017; Kumar et al., 2009; Yusr & Othman, 2011) and enhance financial outcomes (Bateh & Farah, 2018; Swink & Jacobs, 2012).

Numerous studies concluded that the impact of Six Sigma on organisational performance is positive and significant (Ahmed et al., 2018; Ali et al., 2016; Gunawan & Karimah, 2017; Hilton et al., 2008; Hwang et al., 2017; Jacobs et al., 2015; Mishra & Sharma, 2017; Mustafa & Jamaluddin, 2017; Nayeri & Rostami, 2016; Patyal & Koilakuntla, 2017; Shah et al., 2008; Sin et al., 2015; Singh et al., 2017; Swink & Jacobs, 2012; Uluskan et al., 2017; Zu et al., 2008). Therefore, the following hypothesis was proposed:

*Hypothesis 1 (H1): Six Sigma has a significant effect on organisational performance.*

### **3.3.2 Kaizen and Organizational Performance**

Kaizen is a continuous improvement methodology that can be utilised in all aspect of life for conducting improvements, problem-solving, etc. (Imai, 1986; Sawada, 1995). A review the literature revealed that Kaizen has a substantial role in improving organisational performance, employee performance, and work life (Aurel et al., 2015; Hyland et al., 2004; Von Thiele Schwarz et al., 2017), contributing to sustained competitive advantage (Ee Shuang, 2012). Past studies revealed that Kaizen has a positive and significant impact on organisational performance (Abadi et al., 2018; Adesta et al., 2018; Anh et al., 2015; Asaad et al., 2015; Hofer et al., 2012; Mutua et al., 2018; Nguyen, 2019; Rahman et al., 2010; Shah et al., 2017; Shurrab, & Hussain, 2018; Yasar et al., 2017; Yang et al., 2011; Zhou, 2016; Zarinah et al., 2017). Kaizen also has a role in increasing productivity (Ee Shuang, 2012), improving quality system

(Kumar et al., 2017) and enhancing employee performance and quality of work life of employees (Aurel et al., 2015; Hyland et al., 2004; Von Thiele Schwarz et al., 2017). Based on the literature, the following hypothesis was formulated:

*Hypothesis 2 (H2): Kaizen has a significant effect on organisational performance.*

### **3.3.3 Benchmarking and Organizational Performance**

Benchmarking is one of the most popular approaches to performance improvement (Elnathan et al., 1996; Sweeney, 1994; Vaziri, 1993; Venetucci, 1992). It is a systematic methodology used to measure the organisations against others in term of the best practices and enhance high performance. Benchmarking helps organisations to compare their performance with the best-in-class organisations and conduct the required improvements. Empirical evidence suggests that benchmarking contributes to significant improvements in many areas such as customer satisfaction, cost saving, integration, and flexibility (Brah et al., 2000). Benchmarking can also help organisations to accomplish continuous improvement initiatives by quickly identifying the fields that require to be improved and apply the changes in a short time (Camp, 1989). It is also one of important organisational capabilities to reduce time and cost, assist in making better decisions, improve quality and flexibility, enhance fast delivery (Salam & Smadi, 2016) and reinforce organisational self-assessment (Taylor, 1998). Hence, it can be employed as an approach to improve organisational performance, understand and analyse the core competencies of an organisation's competitors (Parast & Adams, 2012), and promote organisation development (M'itonga, 2017).

Past findings of benchmarking and its impact on organisational performance reported that the relationship between them was positive and significant (Abazeed, 2017;

Attiany, 2009; Attiany, 2014; Carr & Smeltzer, 1999; Drew, 1997; Hashim et al., 2012a; Kariuki & Ochiri, 2017; Kerandi et al., 2014; Maiga & Jacobs, 2004; Mehralian et al., 2017; Salam & Smadi, 2016; Sanchez-Rodriguez et al., 2003; Nyaoga et al., 2013; Sawasdiraksa, 2015; Voss et al., 1997; Zoakah et al., 2017). Therefore, the following hypothesis was proposed:

*Hypothesis 3 (H3): Benchmarking has a significant effect on organisational performance.*

### **3.3.4 Six Sigma and Innovation Culture**

Six Sigma provides the tools to create a systematic innovation in an organized way (Eng, 2011). It contributes to encouraging employees of the organisation to evaluate how tasks are organised and performed creatively (Prajogo & Sohal, 2003), driving to corporate culture change and shifting toward achieving superior quality, which in turn promotes a culture of continuous improvement (Erwin & Douglas, 2000). According to Byrne et al. (2007), such culture is further strengthened when the principles of Six Sigma are integrated into the innovation programmes of an organisation. Additionally, several scholars asserted that Six Sigma serves as a foundation or a catalyst for innovation (Antony et al., 2016b; Byrne et al., 2007). Antony et al. (2016b) contended that Six Sigma assists an organisation in making a breakthrough in innovations that improve its business performance. It also enables organisations to create an organisational climate where innovation is expected (Byrne et al., 2007). Similarly, Jacobs et al. (2015) described Six Sigma as an administrative innovation. This is because it provides tools to create systematic innovation in an organized way (Eng, 2011). Additionally, Eriksson and Garvare (2005) reported that continuous improvement methodologies reinforce innovation culture where employees are

interested to learn and enhance team building which leads to building a reliable work environment (Eriksson & Garvare, 2005). Accordingly, the following hypothesis was postulated:

*Hypothesis 4 (H4): Six Sigma has a significant effect on innovation culture.*

### **3.3.5 Kaizen and Innovation Culture**

Building an appropriate culture is the most important factor on for successful implementation of Kaizen (Hansen et al., 2017a; Rad, 2006; Kaplinsky, 1995; Recht & Wilderom, 1998; Tomic et al., 2017). Kaizen has been shown to be a practical approach to change work experience, work proceeding, and work culture (Hashim et al., 2012b). It can adapt with the organisation's culture (Farris et al., 2009), which therefore help the organisation to ensure its operations become more smoothly by eliminating wastes and removing non-adding value activities (Venkataiah & Sagi, 2012).

Atkinson (2010) asserted that cultural change is required when transforming a traditional approach to Lean approach. Organisations may confront more difficulties unless they create the right culture to implement changes (Ahmad, 2013) and institutionalise the principles of Lean (Womack, 2002) to derive the sustained benefits (Badurdeen et al., 2009). Anand et al. (2009) and Brunet and New (2003) stated that Kaizen and culture could assist in enhancing efforts toward sustainable improvement efforts. To support this argument, Pakdil and Leonard (2015) pointed out that the implementation of Kaizen in the west has broadly failed primarily because of the weak understanding of the dimensions of culture that should be aligned to Kaizen.

The literature suggests a relationship between Kaizen and culture (Atkinson, 2010; Badurdeen et al., 2009; Imai, 1986; Kaplinsky, 1995; Recht & Wilderom, 1998; Venkataiah & Sagi, 2012). However, studies that explored Kaizen and innovation culture are scarce (Boer & Gertsen 2003; Choi 1995). Similarly, how Kaizen affects other aspects of an organisation has not been tested (Iwao, 2017). Furthermore, there is a shortage of studies that investigated the relationship between Kaizen and innovation (Bessant & Caffyn, 1997; Boer & Gertsen, 2003; Choi, 1995; Suarez-Barraza & Smith, 2014), and Kaizen and culture (Glover et al., 2015; Hook & Stehn, 2008) despite their importance in the development and improvement processes in both manufacturing and service organisations (Glover et al., 2013; Suarez-Barraza & Miguel-Davila, 2014). Therefore, the following hypothesis was proposed:

*Hypothesis 5 (H5): Kaizen has a significant effect on innovation culture.*

### **3.3.6 Benchmarking and Innovation Culture**

Implementing successful benchmarking highly depends on creating an appropriate culture (Abazeed, 2017; Hanson & Voss, 1995; Hashim et al., 2012a; Salem, 2003; Williams et al., 2012), which should focus on continuous improvement, quality communication, and organisational values that meet the needs and expectation of employees and customers (Williams et al., 2012; Zairi & Whymark, 2000). Zoakah et al. (2017) indicated that benchmarking could create a culture of continuous improvement by learning from the best practices. Such culture plays a critical role in enhancing a benchmarking project to improve organisational performance (Abazeed, 2017). Therefore, it is essential to put benchmarking as part of the organisational culture for successful implementation (Hashim et al., 2012a). Several researchers have

studied the relationship between benchmarking and culture (Kyriakidou & Gore, 2005; Salem, 2003; Zairi & Whymark, 2000).

Benchmarking also aims to gain explicit and tacit knowledge (Drew, 1997; Lucertini, Nicolo & Telmon, 1995) for enhanced innovation (Massa & Testa, 2004). As well, benchmarking provides insight into the innovation process, which helps an organisation be more competitive (Radnor & Robinson, 2000). Such knowledge and innovativeness become a part of a benchmarking culture, which is critical in enhancing the performance and effectiveness of the organisation. Therefore, the following hypothesis was proposed:

*Hypothesis 6 (H6): Benchmarking has a significant effect on innovation culture.*

### **3.3.7 Innovation Culture and Organizational Performance**

The literature highlights the essential role of an innovation culture in organisational performance (Akbari & Monzavi, 2015; Cable, 2010; Dobni, 2008; Kasraei et al., 2015; Pharaon & Burns, 2010). For example, Hurley and Hult (1998) reported that innovativeness in organisations is linked directly to organisational culture. Similarly, Lendel and Varmus (2011) and Tushman (1997) concluded that absorbing innovation into the culture of an organisation and its management processes help it to achieve remarkable success. Innovation also is one of the fundamental elements that influence performance and help to attain competitive advantage (Leal-Rodríguez et al., 2015). It has also positively affected an organisation's profit, growth, and market share (Galindo & Méndez, 2014; Kung & Schmid, 2015; Deshpande et al., 1993), return on assets (Ndicu, 2018; Salavou, 2002), sales growth (Choi & Williams, 2014), and employment growth (Vivarelli, 2014). Besides, in a turbulent and competitive environment,

innovation drives organisations to maintain their competitive position and excellence (Gaynor, 2002; Rodríguez et al., 2015). Generating new products, services and processes are critical for organisations to confront rivals (Porter & Stern, 2001).

Innovation culture also has a substantial role in shaping values, beliefs and commitment of employees to help an organisation be competitive (Kuratko & Welsch, 2004). This culture can be promoted through socialisation of the workplace (Xerri & Brunetto, 2011) where employees are encouraged to learn and share ideas to contribute to the improvement process (Skerlavaj et al., 2010).

Empirical investigations demonstrated that innovation culture positively and significantly impacted organisational performance (Anderson et al., 2012; De Brentani, 2001; De Brentani & Kleinschmidt, 2004; Kuo & Tsai, 2017; Lee et al., 2017a; Rosenbusch et al., 2011; Salim & Sulaiman, 2011; Stock et al., 2013; Wei et al., 2012; Zhang & Huang, 2010). Therefore, the following hypothesis was proposed:

*Hypothesis 7 (H7): Innovation culture has a significant effect on organisational performance.*

### **3.3.8 Innovation Culture as a Mediator between Six Sigma and Organizational Performance**

Bessant et al. (1994) maintained that continuous improvement tools do not always generate success and are particularly difficult to sustain in the long-term. Therefore, they contended that creating an appropriate culture will help an organisation produce innovation and maintain improvement. Fryer et al. (2007) also stated that many factors including culture influence the successful implementation of continuous improvement programmes. Creating and sustaining a culture is essential to allow employees to

innovate and generate new ideas which contribute to improving processes, services, and products (Skerlavaj et al., 2010), helping the organisation to respond effectively to environmental changes and hence achieve a sustainable competitive advantage and performance (Calantone et al., 2002; Zaltman et al., 1973).

One of the tools that can enhance innovation is Six Sigma where organisations can gather information about their customers and learn to innovate and improve continuously (Eng, 2011), resulting in improved organisational performance (Chiarini, 2013; Gunawan & Karimah, 2017; Khaidir et al., 2013). Erwin and Douglas (2000) mentioned that Six Sigma contributes to changing an organisation's culture which in turn leads to enhancing the culture of continuous improvement and subsequent organisational performance (Hult et al., 2004).

Studies have shown that successful implementation of Six Sigma depends on an appropriate culture (Antony & Banuelas, 2002; Cheng, 2007; Kwak & Anbari, 2004). As well, adopting Six Sigma contributes to enhancing innovation and assisting in supporting such a culture based on continual innovation (Byrne et al., 2007). Knapp (2015) emphasised the importance of culture in applying Six Sigma projects in an organisation because a group culture affects the successful implementation of the quality initiative and organisational performance (Hult et al., 2004). Accordingly, the following hypothesis was proposed:

*Hypothesis 8 (H8): Innovation culture mediates the relationship between Six Sigma and organisational performance.*

### **3.3.9 Innovation Culture as a Mediator between Kaizen and Organizational Performance**

Culture has a vital role in implementing improvement programmes (Crandall, 2011; Pakdil & Leonard, 2015). Therefore, the adoption of Kaizen in an organisation highly depends on organisational culture (Badurdeen et al., 2009; Dahlgaard & Dahlgaard-Park, 1999; Hansen et al., 2017a; Rad, 2006; Recht & Wilderom, 1998; Tomic et al., 2017). Cultural change is required when transforming traditional to a continuous improvement approach, such as Kaizen (Ahmad, 2013; Atkinson, 2010). Kaizen has been shown to help change work experience, proceeding, and culture of an organisation (Hashim et al., 2012b), resulting in enhanced organisational performance (Venkataiah & Sagi, 2012). Kaizen and culture can assist in sustainable improvement efforts (Anand et al., 2009; Brunet & New, 2003) by assisting employees to improve their work area (Doolen et al., 2008), as well as building their capability to influence both the social and technical systems of the organisation (Farris et al., 2008), contributing to improved organisational performance (Venkataiah & Sagi, 2012). Therefore, the following hypothesis was proposed:

*Hypothesis 9 (H9): Innovation culture mediates the relationship between Kaizen and organisational performance.*

### **3.3.10 Innovation Culture as a Mediator between Benchmarking and Organizational Performance**

Benchmarking is a management strategy that includes quality and innovation techniques (Clemente & Balmaseda, 2010; Del Giorgio Solfa, 2012). It has a role in enhancing and facilitating the creation and implementation of innovation (Gierczak-Korzeniowska & Gołembski, 2017; Radnor & Robinson, 2000), resulting in the development of innovation culture (Gierczak-Korzeniowska & Gołembski, 2017). In such a culture, learning can be enhanced to drive organisational performance. A culture

based on innovation is a basis for innovative employee behaviours that which can support the organisation and encourage its renewal and subsequent performance (Cameron & Quinn, 1999; Dobni & Klassen, 2018; Hogan & Coote, 2014). The critical interest in benchmarking culture lies in its considerable long-term impact on organisational performance (Denison, 1984). Such a culture could be an advantage for the organisation as it is hard for other organisations to imitate. Therefore, the following hypothesis was proposed:

*Hypothesis 10 (H10): Innovation culture mediates the relationship between benchmarking and organisational performance.*

### **3.4 Summary**

This chapter highlighted the conceptual framework of the study, the research hypotheses, and the proposed research model. Hypotheses were developed to test the relationship between Six Sigma, Kaizen, benchmarking, and organisational performance which are consistent with the questions and objectives of the research. This study also investigated the mediating effects of innovation culture on the relationship between Six Sigma, Kaizen, and benchmarking. The next chapter describes the methodology used to carry out the study.

## **CHAPTER FOUR**

### **RESEARCH METHODOLOGY**

#### **4.1 Introduction**

The present chapter discusses the philosophy and methodology applied in this study. It also addresses the study design, the questionnaire design, the measures applied, population and sampling, and the data collection procedure. Also, this chapter proposes statistical techniques to be used to analyse the data.

#### **4.2 Design, Paradigm and Philosophy of the Study**

A research design is a plan for accomplishing research objectives (Oppenheim, 2000). Knowing the research design and its philosophical matters is fundamental for any research because it facilitates and allows to interpret the research, which provides the researcher primary consideration about the evidence needed to be collected, as well as giving clues to the central questions being examined in the study. It also assists the researcher in identifying the appropriate designs that correspond with the research chosen (Mark, Richard, & Andy, 2002).

Paradigm is a collection of basic assumptions about how the world is, how the world should be and how the world could be best understood (Bryman & Bell, 2007; Wilson, 2001). Philosophy on the other hand is essentially the anchor or the conceptual foundation guiding the search for knowledge (Wilson, 2001). These conceptual foundations include ontology, epistemology, axiology, and methodology. The relationship between paradigm and philosophy is that each paradigm adopted for a

research must be guided by appropriate philosophies (Bryman & Bell, 2007; Wilson, 2001). The next paragraphs explain the meaning of the highlighted philosophical issues in research and subsequently major paradigms are discussed, indicating the philosophical position of each.

There are two popular paradigms in the field of business and management research: interpretivism and positivism (Bryman & Bell, 2007). The interpretivism school assumes that the world is socially created from the knowledge of people within it. Therefore, it intensely relies on personal understanding. In this philosophy, the researcher tries to generate a symbiotic relationship with their environment and make conclusions based on the information obtained. Supporters of the interpretivism school tend to depend on qualitative approaches that generate meaning from participants (Stiles, 2003).

On the other hand, the positivist philosophy is recognised as the obligatory model of the natural sciences where value-free research is one that is only accepted as valid (Easterby-Smith, Thorpe & Jackson, 2008). Positivism is the quest for objective measured reality as only valid knowledge (Saunders, Lewis, & Thornhill, 2009). Scientific observations should be quantifiable and available for statistical analysis, and findings of the research can be replicated before they are validly expressed as generalisations (Remenyi, Williams, Money, & Swartz, 2005). From a positivist paradigm, even though quantitative or qualitative approach can be used to develop a hypothesis, attempt to confirm that hypothesis should be made quantitatively (Saunders et al., 2009). This philosophy is founded on the belief that the study of human behaviour should be undertaken in a similar approach as research conducted in the natural sciences (Collis & Hussey, 2013). This philosophy seeks to determine,

measure and evaluate the phenomena of the study to provide a logical explanation through a set of causal relations and links among the related variables and connecting them to a particular practice or theory.

This research examined the relationship between continuous improvements tools and organisational performance in the Dubai Police. Therefore, positivism was the underlying paradigm of this study. Under such a paradigm, a deductive reasoning is used to describe the nature of the correlation between theory and research. In the deductive reasoning, the researcher develops hypotheses based on theories and test the hypotheses by using relevant statistical techniques (Bryman, 2015, Saunders, Lewis, & Thornhill, 2007). This approach assists in establishing, changing, or refuting theories based on the data collected. This study employed a deductive reasoning for the following reasons:

- a. Deductive reasoning sees research as a systematic process that flows from selection of a model or theory, formulating a hypothesis, conducting a strictly controlled experiment, applying inferential statistics to test the formulated hypothesis and interpreting the results within the context of the adopted theory (Cacioppo, Semin, & Berntson, 2004). Therefore, studies on continuous improvement tools allow the researcher to determine a theoretical framework and formulate hypotheses as recommended by Sekaran (2003), which give a clear direction to choose the deductive method.
- b. Generalisation: a deductive quantitative method aims to determine associations that are familiar across organisations and individuals and, thus, give a

comprehensive description or theory about the phenomenon being studied (Creswell, 2013).

- c. This approach seeks to prove a causal association between the variables (Clifford, Cope, Gillespie, & French, 2016).

Employing the deductive reasoning directs the researcher to use experimental or survey strategies. In this study, a cross-sectional survey was employed for the following reasons:

- a. Choosing a cross-sectional examination allows the researcher to conserve resources, effort and time compared with a longitudinal approach (Creswell, 2013).
- b. A survey is compatible with the deductive reasoning and is most commonly applied in business or management research (Saunders et al., 2009).
- c. Data gathered from the survey enable a straightforward comparison and statistical analysis (Saunders et al., 2009).
- d. A survey permits collecting data from a large population cost-effectively (Leedy & Ormrod, 2005).
- e. A survey permits the researcher a high range of control over the process of the research (Sekaran, 2003).

A quantitative survey collected data from participants about their perceptions, beliefs, and attitudes. Such quantitative research emphasises gathering and analysing

numerical data. In this study, data were collected from participants on Six Sigma, Kaizen, benchmarking, innovation culture, and organisational performance in the Dubai Police.

### 4.3 Population and Sampling Procedures

Sampling refers to the process of choosing cases from the whole population (Saunders et al., 2009). Seven steps of a sampling process have been followed in this study as shown in Figure 4.1.

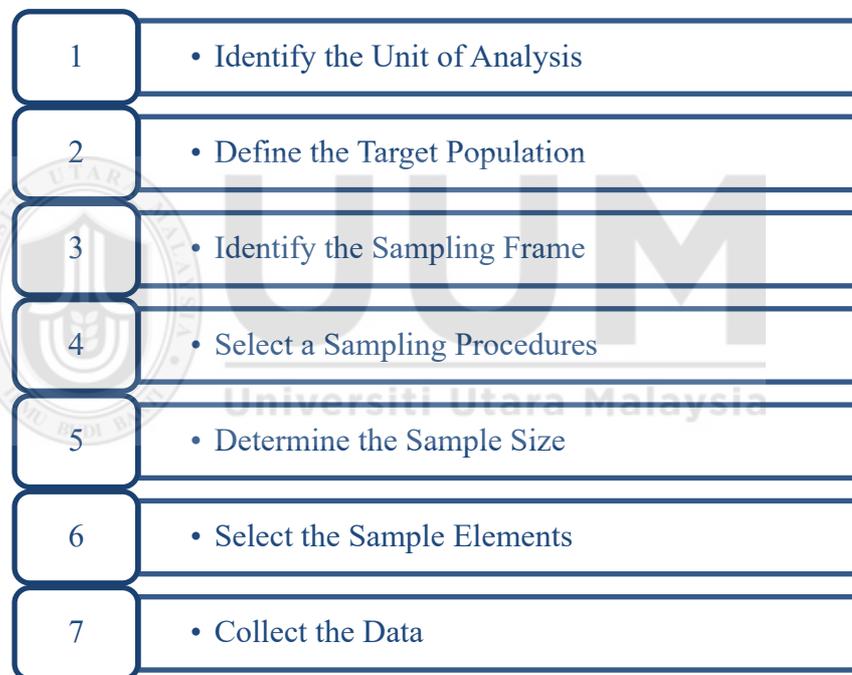


Figure 4.1  
*Seven-Steps Prodecugers for Drawing the Study Sample*

#### 4.3.1 Unit of Analysis

A unit of analyses refers to the level of investigation or aggregation of collected data (Sekaran, 2000; Zikmund, 2003). A unit of analysis in social sciences may be a group

of individuals, a group of organisations, social interaction, an organisation, or an individual.

The purpose of this research was to examine the hypothesised relationships at the organisational level in the Dubai Police which were sections in the general departments and police stations. These sections represent middle management and represented by head section officers who are familiar with continuous improvement activities, operations performance, and organisational performance. The sections also play a pivotal role in creating, monitoring and updating of the organisation's performance measures, formulating and implementing strategies, and implementing continuous improvement initiatives. Moreover, the sections were chosen because the implementation of continuous improvement projects, business plan, and quality initiatives are under their responsibility. At this level, the head section officers know and understand continuous improvement programs better than any other units of the organisation, and the majority of in-charge officers had received training on Six Sigma, Kaizen, and benchmarking. Consequently, the head section officers had experience and knowledge to implement, evaluate and follow up programs and initiatives such as Six Sigma, Kaizen and benchmarking. Moreover, their position that sits between managers and employees allow them to know the practices and implement continuous improvement programmes (See appendix A for details).

Also, many previous studies related to continuous improvement tools were conducted at the organisational level. Each section was considered as a separate entity where its performance was treated independently. This is in line with many researchers who considered business units (sections) when studying organisation strategies, such as quality and improvement techniques (Al-Dhaafri et al., 2016a; Al-Swidi & Mahmood,

2012; Nawadir, 2016; Reed, Lemak, & Montgomery, 1996). Therefore, this study selected the sections to be the unit of analysis.

### 4.3.2 Define the Target Population

According to Sekaran and Bougie (2010), population refers to a set of organisations or people that is of interest to the researcher. A target population refers to the total number of cases that conform to some designated specifications (Iacobucci & Churchill, 2010). The structure of Dubai Police contains 837 section as shown in Table 4.1 (See Appendix A for more details). These sections made up the population of this study.

Table 4.1  
*Numbers of Head Sections in General Departments and Police Stations*

Department /Police Station	No. of Sections
General Department of Criminal Investigation	97
General Department of Forensic Science and Criminology	46
General Department of Airports Security	53
General Department of Traffic	38
General Department of Anti Narcotic	28
General Department of Operation	33
General Department of Administrative Affairs	18
General Department of Human Rights in Dubai Police	22
General Department of Punitive and Correctional Establishments	36
General Department of Organizations Protective Security and Emergency	33
General Department of Human Resources	31
General Department of Services and Supplies	47
General Department of Excellence and Pioneering	49
General Department of Artificial Intelligence	27
General Department of Finance	16

Table 4.1 (continued)

General Department of Community Happiness	35
Future Foresight and Decision-Making Support Center	24
Dubai Police Academy	58
General Department of Training	20
Head Quarter's Regulatory Office	24
General Department of Transport and Rescue	28
Police Stations (11 Stations)	74
Total	837

### 4.3.3 Identify the Sampling Frame

A sample frame is the list of elements from which the sample is drawn (Iacobucci & Churchill, 2010). This step aims to identify the sampling frame which is in this study the head sections list in the Dubai Police which involves of 837 officers as shown in Table 4.1.

### 4.3.4 Select a Sampling Procedure

Sampling refers to the process of selecting enough number of elements from the targeted population, which allow researchers to generalise the characteristics (Karlsson, 2016). This research employed proportionate stratified random sampling. In the random sample method, each in the population has an equal probability to be selected (Creswell, 2013; Sekaran, 2006). This technique requires a sample size large enough which approximate the characteristics of the population satisfactory to provide a credible result (McMillan & Schumacher, 2001).

Table 4.2 shows random sampling based on proportionate stratified sampling. It shows the number of proposed samples in each department and its percentage. This sampling

is used when there are many subgroups in the population. In the Dubai Police, there are many general departments and police stations with a different number of sections. The number of samples was calculated based on the number of populations in each of them where the number of samples was divided by the number of population by the number of sections in each department or police station.

#### **4.3.5 Determine the Sample Size**

A sample size refers to the number of units required to be surveyed to get reliable and accurate results (Fink, 1995). To determine the minimum sample size, Hair et al. (2014) recommended running a power analysis test. A priori power analysis was carried out using G\*Power 3.1.9.1 software (Faul, Erdfelder, Buchner, & Lang, 2007). Based on some recommended statistical parameters (Cohen, 1992; Faul, Erdfelder, Buchner & Lang, 2009): medium effect size  $f^2$  (0.15), an alpha significance level ( $\alpha$  err prob, 0.05); power ( $1 - \beta$  err prob; 0.95), three predictors (i.e. Six Sigma, Kaizen and benchmarking), and five main numbers of predictors as total (i.e. Six Sigma, Kaizen, benchmarking, innovation culture, and organisational performance), a minimum sample of 119 would be required to test a regression-based model (See Figure 4.2).

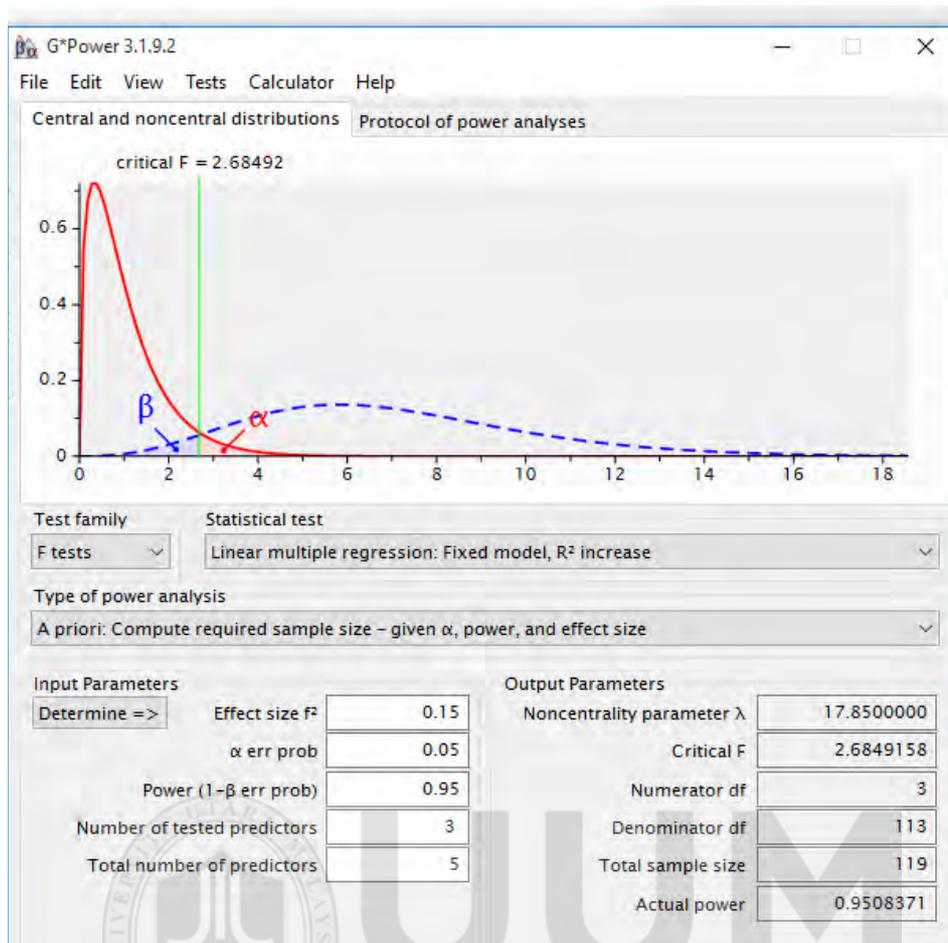


Figure 4.2  
*A Priori Power Analysis Result*

Although the result of the *a priori* power analysis in Figure 4.2 indicates a minimum of 119 participants would be needed for this study, to avoid the issue of low response rate, it became necessary to contemplate other means to determine larger sample size. Wong (2013) advised that the goal of a researcher in selecting an appropriate sample size should not be just to fulfil the minimum sample size requirement; the required sample size must be increased to meet certain research objectives. Therefore, one of the famous formulas to determine sample size was developed by Krejcie and Morgan (1970). Based on the table of Krejcie and Morgan below (Table 4.2) for determining sample size, for a given population of 837, a sample size of 260 is required to represent a cross-section of the population.

Table 4.2  
*Table for Determining Sample Size from a Given Population*

N	S	N	S	N	S
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	100000	384

Note. N is population size. S is sample size  
 Source: Krejcie and Morgan (1970)

Additionally, to solve a possible low response rate, Bartlett, Kotrlik, and Higgins (2001) suggested oversampling to fulfil the required sample size, especially in social research studies. Oversampling helps to take care of the possible loss as a result of damages and non-cooperative subjects (Salkind, 1997). Specifically, oversampling is used so that non-response bias and non-response rate will not affect the results (Just, 2008; Sindhu & Pookboonmee, 2001).

The response rate in past studies conducted in the Dubai Police was 81.5 per cent (Abdulla, 2009; Abdulla et al., 2011), 74 per cent (Al Dhaafri & Al Swidi, 2013), 72 per cent (Malik, Danish & Munir, 2011), 48 per cent (Al-Dhaafri et al., 2016a), 70% (Al-Dhaafri, Al-Swidi, & Al-Ansi, 2016b), 93 per cent (Chu, 2017), 86.5 per cent (Seba, Rowley, & Lambert, 2012). Because of the volatile response rate, the response rate of the pilot study of 70 per cent was applied to get the sample size. For this study,

338 questionnaires instead of 260 were distributed among the head section offices in the Dubai Police.

#### **4.3.6 Select the Sample Elements**

Sample elements (participants) should have knowledge or understanding of the impact of continuous improvement tools on organisational performance (John & Reve, 1982; Kumar, Stern, & Anderson, 1993). In this case, the appropriate elements to answer the questionnaire in this study were head section officers. This is because they are middle managers and play a pivotal role in creating, monitoring, and updating of the organisation's performance measures (Pingitore & Williams-Dalgart, 2012). They are also managing the operating core of the force. The level of the hierarchy is important for the force because it implements and operationalises strategic plans. The head section officers also facilitate the creation of knowledge initiatives (Nonaka & Takeuchi, 1995), formulation and implementation of the strategy (Mintzberg, 1987), and implementation of continuous improvement initiatives (Manville, Greatbanks, Krishnasamy & Parker, 2012).

As mentioned above, sample elements were chosen based on proportionate stratified sampling. The Randomizer Programme available online was used to pick appropriate samples randomly. The selection of samples was done in two steps. First, all 837 sections were numbered with their strata (department). Second, based on the strata and its percentage of sampling as shown in table 4.3, numbers of samples were picked by Randomizer randomly for each stratum. The total of those samples was 338 out of 837. Table 4.3 below shows the sample size for each department where the number of proposed samples in each department and its percentage were considered.

Table 4.3  
*Proposed Sample for Each Department*

Department /Police Station	No. of Sections	Percentage	Proposed Sample
General Department of Criminal Investigation	97	12%	39
General Department of Forensic Science and Criminology	46	5%	19
General Department of Airports Security	53	6%	21
General Department of Traffic	38	5%	15
General Department of Anti Narcotic	28	3%	11
General Department of Operation	33	4%	13
General Department of Administrative Affairs	18	2%	7
General Department of Human Rights in Dubai Police	22	3%	9
General Department of Punitive and Correctional Establishments	36	4%	15
General Department of Organizations Protective Security and Emergency	33	4%	13
General Department of Human Resources	31	4%	13
General Department of Services and Supplies	47	6%	19
General Department of Excellence and Pioneering	49	6%	20
General Department of Artificial intelligence	27	3%	11
General Department of Finance	16	2%	7
General Department of Community Happiness	35	4%	14
Future Foresight and Decision-Making Support Center	24	3%	10
Dubai Police Academy	58	7%	23
General Department of Training	20	2%	8
Head Quarter's Regulatory Office	24	3%	10
General Department of Transport and Rescue	28	3%	11
Police Stations (11 Stations)	74	9%	30
<b>Total</b>	<b>837</b>	<b>100%</b>	<b>338</b>

#### **4.3.7 Collect the Data**

Once the respondents were identified, the next procedure was the distribution of the questionnaires. Questionnaire are considered as an efficient data collection method. It is commonly used in quantitative studies to acquire large data in order to generalize to the population as a whole (Hair, Money, Samouel, & Page, 2007). A drop-off and online questionnaires survey were employed. The questionnaires were personally distributed to the respondents between March and May 2018. Before the survey was administered, the researcher obtained official permission from the Dubai Police Headquarters. The respondents were asked to complete the questionnaire within one week. During this period, follow-up telephone calls were made to remind respondents to complete the questionnaire. After one week, the researcher collected the completed questionnaires. For those who did not return the questionnaire at the end of one-week period, the questionnaires were considered as unreturned, which therefore led to employ an online questionnaire for respondents who did not complete drop-off questionnaires.

#### **4.4 Measurement of Variables and Instrumentation**

This study had a cover letter, which went along with the questionnaire. The cover letter briefly states the purpose of study, the confidentiality of the gathered data, and instructions on how to answer the questionnaires. The dependent variable was organisational performance, and the independent variables were Six Sigma, Kaizen, and benchmarking. Innovation culture was employed as the mediating variable. The variables were measured using numerous items derived from previous studies. These items were modified to correspond to the sample and local setting. Importantly, all variables of the study were measured unidimensionally and reflectively following the

approach of several studies (Al-Dhaafri et al., 2016; Al-Refaie, & Hanayneh, 2014; Homaid, Minai & Rahman, 2015; Hwang, Lee, & Seo, 2018; Guaderrama, Arroyo & Monge, 2016; Hall, 2004; Min, Homaid, Minai & Zain, 2016; Parast, 2011; Sin et al., 2015; Ström, 2018; Swink & Jacobs, 2012). A unidimensional/reflective construct implies that the items measuring the constructs are closely related. When constructs are measured unidimensionally and/ reflectively, the deletion of some of the items in the course of measurement model assessments will not necessary hamper their content validity (Hair et al., 2014). Given this, the variables of this study are operationalised below, taking into consideration the dependent, independent, and mediating variables of the study.

A Likert scale, which is one of the most common and appropriate tools to gather data, was used (Al-Marri, Ahmed, & Zairi, 2007; Babatunde, Perera & Adeniyi, 2019). Furthermore, participants could deal with this scale easily and reflect their opinions in the survey. Therefore, this study used this tool to examine the effect of the variables on organisational performance. The 5-point Likert scale used in this study had possible responses that ranged from “1” (strongly disagree) to “5” (strongly agree).

#### **4.4.1 Organizational Performance Measure**

Different measures have been used to measure organisational performance. One of the most popular constructs is the balanced scorecard (BSC). BSC has been employed to measure organisational performance in continuous improvement practices (Hirschel, 2012) such as Six Sigma (Habidin, 2012; Habidin & Yusof, 2012; Habidin et al., 2016; Khaidir et al., 2013), Kaizen (Iselin et al., 2009), and benchmarking (Al-Dhaafri et al., 2016a; Mehralian et al., 2017). The BSC approach was developed by Kaplan and Norton (1992) to address the limitations and obstacles on measures that depend solely

on financial gauges. It combines both financial and non-financial measures to address problems occurring in measurement systems that rely on historical performance (Mehralian et al., 2017; Norreklit et al., 2008), which could lead to unreal results (Kaplan & Norton, 1992; Sondakh et al., 2017). Also, the BSC integrates other perspectives that impact on performance including financial outcomes (Kaplan & Norton, 1992).

This study employed the BSC to measure organisational performance in the Dubai Police. The indicator items were adapted from the study by Mafini and Pooe (2013) in their study in government social services departments in South Africa. According to Mafini and Pooe, the reliabilities of the BSC measures were reportedly high as shown in Table 4.4.

Table 4.4  
*Reliabilities and Mean Score for the BSC Performance Measures*

BSC Perspective	Reliability (Cronbach Alpha)	Mean
Financial	0.835	4.460
Customer	0.754	4.575
Internal Process	0.851	4.396
Innovation and Learning	0.763	4.632

This study employed these evaluation indicators to measure organisational performance in the Dubai Police. These indicators were adapted to fit the characteristics of the Dubai Police. Table 4.5 shows the measure that contained 23 items.

Table 4.5  
*Organizational Performance Measure*

Code	Items
Financial Perspective	
PF1	Resources are managed efficiently.
PF2	The funds that are allocated to our section are sufficient.
PF3	Effective financial control measures are in place.
PF4	The overall financial performance of our section is good.
PF5	Our section is always able to meet its financial goals”.
Customer Perspective	
PC6	Our section is able to meet our client demands.
PC7	Most of our section’s clients are satisfied.
PC8	The time taken to deliver services in our section is quite acceptable.
PC9	Feedback from our clients is taken seriously.
PC10	Our section offers quality service.
PC11	Delivery performance to our clients is good.
Internal Business Process Perspective	
PP12	The number of staffs leaving our section is small.
PP13	Communication flows easily throughout our section.
PP14	Programs are implemented speedily.
PP15	Divisions are not overloaded with activities.
PP16	Our section relates well with other sections.
PP17	Our section implements effective strategies.
PP18	The level of wastage in our section is low.
Innovation and Learning Growth Perspective	
PG19	We have the chance to participate in training and section programs.
PG20	Our section adopts new technology regularly.
PG21	Innovation is encouraged in our section.
PG22	There is good teamwork in our section.
PG23	We have ample opportunities to make independent decisions.

#### 4.4.2 Six Sigma Measure

Several constructs were employed to measure Six Sigma in previous literature (See Appendix C-1). One of the most applied measurements was by Zu et al. (2010), and Desai, Antony, and Patel (2012). They stated four distinctive fundamental practices in applying Six Sigma in an organisation: role structure, structured improvement procedure, metrics, and methodology. The items of these measures were adapted to fit the Dubai Police. The total of items employed was 20 (see Table 4.6). Several studies had validated the items (Antony et al., 2005; Desai et al., 2012; Zu et al., 2010).

Table 4.6  
*Six Sigma Measure*

Code	Item	Source
Six Sigma role structure		
SR1	“We employ a black/green belt role structure for continuous improvement.”	Zu et al. (2010, p.102)
SR2	“We use a black/green belt role structure to prepare and deploy individual employees for continuous improvement programs.”	
SR3	“The black/green belt role structure helps our section to recognize the depth of employees’ training and experience.”	
SR4	“In our section, members of a quality improvement team have their roles and responsibilities specifically identified.”	
SR5	“Our section uses differentiated training so that employees who have different roles in the black/green belt role structure (or equivalent structure) can obtain the necessary knowledge and skills to fulfil their job responsibilities.”	
Six Sigma structured improvement procedure		
SS6	“In our section, Six Sigma projects are conducted by following a formalized procedure.”	Zu et al. (2010, p.102)
SS7	“We use a structured approach to manage quality improvement activities.”	

Table 4.6 (continued)

SS8	“We have a formal planning process to decide the major quality improvement projects.”	
SS9	“We keep records about how each Six Sigma project is conducted.”	Zu et al. (2010, p.102)
SS10	“All improvement projects are reviewed regularly during the process.”	
SS11	“In our section, the service design process follows a formalized procedure.”	
Six Sigma focus on matrices		
SF12	“Our section has a comprehensive goal-setting process for quality.”	
SF13	“Quality goals are clearly communicated to employees in our section.”	
SF14	“In our section, quality goals are clear and specific.”	
SF15	“Our section translates customers’ needs and expectation into quality goals.”	Zu et al. (2010, p.103)
SF16	“In our section, measures for quality performance are connected with the organization's strategic quality goals.”	
SF17	“Our section systematically uses a set of measures (such as defects per million opportunities, sigma level, process capability indices, defects per unit, and yield) to evaluate process improvements.”	
Understanding of Six Sigma methodology		
SU18	“We understand fully ALL steps of the DMAIC methodology.”	
SU19	Our section has adapted with Six Sigma methodology.	Antony et al. (2005); Desai et al., (2012)
SU20	“We use simple tools and techniques during Six Sigma implementation.”	

#### 4.4.3 Kaizen Measure

Numerous kinds of research have been conducted to develop a reliable measurement for Kaizen, and several constructs were applied to measure it (see Appendix C-2). The present study employed 21 items to measure Kaizen (see Table 4.7). These items were

adapted from studies conducted by Doolen et al. (2008) Farris et al., (2009) and Glover et al., 2015. Specific changes and additional items were made to fit the Dubai Police.

Table 4.7  
*Kaizen Measure*

Code	Item	Source
Attitude		
KA1	Kaizen activities increase our interest in work.	Doolen et al. (2008, p.643)
KA2	“We like being part of continuous improvement activities.”	
KA3	“Kaizen activities motivate us to perform better.”	
KA4	“We would like to be a part of Kaizen activities in the future.”	
Skill		
KS5	“We can communicate new ideas about improvements to work area as result of our participation in Kaizen activities.”	Doolen et al. (2008, p.643); Glover et al. (2015, p.18).
KS6	“We have gained new skills as a result of our participation in Kaizen activities.”	
KS7	“We are comfortable working with others to identify improvement in this work area.”	
Understanding need for Kaizen		
KU8	“We understand how Kaizen can be applied in the work area.”	Doolen et al. (2008, p.643).
KU9	“We understand the objectives of implementing Kaizen.”	
KU10	“We understand our role in Kaizen.”	
KU11	“We understand what Kaizen is.”	
Management support		
KM12	Kaizen activities have the support from senior management.	Glover et al. (2015); Farris et al. (2009)
KM13	Management has provided enough resources for the Kaizen activities.	
KM14	Management champions the value of Kaizen activities.	Glover et al. (2015); Farris et al. (2009)
KM15	Management in our section allows employees in the work area to participate in Kaizen activities.	

Table 4.7 (continued)

Kaizen performance review		
KP16	In our section, the team of Kaizen regularly reviews performance data related to Kaizen goals’.	Glover et al. (2015, p.18);
KP17	“In our section, the team of Kaizen conducts regular audits on changes made due to the Kaizen.”	Kaye and Anderson (1999)
KP18	“In our section, the team of Kaizen informs higher-level management of issues with follow-up and sustaining results from the Kaizen.”	
Accepting changes		
KC19	“In our section, management accepts the changes made as a result of the Kaizen”.	Glover et al. (2015, p.18).
KC20	“In our section, employees accept the changes made as a result of the Kaizen.”	
KC21	“In our section, employees in the work area accepts the changes made as a result of the Kaizen.”	

#### 4.4.4 Benchmarking Measure

The past literature has reviewed to highlight the instruments employed to measure benchmarking. The instrument used by Brah et al. (2000) was employed to measure benchmarking in the present study. The instrument had 18 items as shown in table 4.8 below. The items were adapted to fit and use in the Dubai Police context.

Table 4.8

#### *Benchmarking Measure*

Code	Item	
Internal Assessment		
BA1	“We were open to changes and other new ideas.”	Brah et al. (2000, p.8)
BA2	“We had a comprehensive quality program (e.g. Total Quality Management).”	

Table 4.8 (continued)

BA3	“We had conducted internal benchmarking.”	
BA4	“We truly knew and understood our own operations.”	
BA5	“We were aware that a portfolio of learning opportunities existed.”	
Employee Participation		
BE6	“We had a dedicated project steering committee.”	Brah et al. (2000, p.8)
BE7	“Employees fully understood the benchmarking project’s objectives and benefits.”	
BE8	“Employees were educated and trained in benchmarking.”	
BE9	“Employees were willing to participate in the benchmarking projects.”	
Looking for best practices		
BB10	“We monitor competitors to find out the best policing industry practices.”	Brah et al. (2000, p.8)
BB11	“Benchmarking is our strategy to achieve a better competitive position.”	
BB12	“In our section, we conduct research to find out the best practices of other local and international organizations.”	
BB13	“It is always emphasized that benchmarking is our strategy to achieve a better competitive position.”	
Benchmarking Process		
BP14	We were willing to share results with our benchmarking partners.	Brah et al. (2000, p.8)
BP15	“There was a great understanding of benchmarking process in the section.”	
BP16	“Benchmarking was formally implemented.”	
BP17	“The benchmarking process was well planned.”	
BP18	“The benchmarking process was completely carried out.”	

#### 4.4.5 Innovation Culture Measure

Innovation culture has studied from various authors, some of them focus on behaviors and features of individuals to realize this phenomenon, some others employ more holistic models (Naranjo-Valencia & Calderon-Hernández, 2018). The components of

innovative culture, which have been used by certain researchers, are summarized in Appendix C-3. One of the most popular measurements is one developed by Dobni (2008). The study employed this measurement to gauge innovation culture in public sector organisation and was adapted to suit the study's requirement.

According to Dobni (2008), this measurement had significant construct validity that exceeded 0.70. Dobni (2008) reported that an alpha of 0.81 was achieved after running a single factor exploratory factor analysis. Overall, the index was reported to have moderate to high reliability with an internal consistency reliability of 0.83 and a retest correlation coefficient between 0.72 and 0.90. The evaluation was based on 21 questions on innovation. These instruments were adapted from Dobni (2008, pp.246-249) to fit the Dubai Police. Table 4.9 shows the items.

Table 4.9  
*Innovation Culture Measure*

Code	Item
IC1	“When we find out something important about a customer or competitor that may affect others in the section, we know what to do with that information.”
IC2	“We have a good understanding of the value chain and vital interests concerning our section.”
IC3	“We are encouraged to flush out information on what most would consider the “not so obvious” or even obscure.”
IC4	“Knowledge generation is strategic in that we have a reliable and valid process that surveys stakeholders on a consistent basis, and that knowledge is used to direct plans.”
IC5	“We co-define value with our customers.”
IC6	“There is a consensus amongst employees about what creates value for customers/stakeholders.”
IC7	“We actively search for new ideas and investigations at all stages of service development.”
IC8	“We get the information we need to make value added decisions.”

Table 4.9 (continued)

IC9	“We understand what systems/processes we must excel at to deliver customers/stakeholders value.”
IC10	“Innovation in our section is more likely to succeed if employees are allowed to be unique and express this uniqueness in their daily activities.”
IC11	“We view uncertainty as opportunity and not as a risk.”
IC12	“This section uses out creativity to its benefits, that is, it uses it in a good way.”
IC13	“We are given the time/opportunity to develop our creative potential.”
IC14	“We are prepared to do things differently if given the chance to do so.
IC15	Innovation is an underlying culture and not just a word.”
IC16	“Our business model is premised on the basis of strategic intent.”
IC17	“Our senior managers are able to effectively cascade the innovation message throughout the organization.”
IC18	“We have an innovation vision that is aligned with projects, platforms, or initiatives.”
IC19	“This management team is diverse in their thinking in that they have different views as to how things should be done.”
IC20	“There is a coherent set of innovation goals and objectives that have been articulated.”
IC21	“Innovation is a core value in this section.”

#### 4.4.6 Demographic Information

Respondents were asked about their personal background and the organizational experience. The respondents were to indicate their gender, education, and experience.

#### 4.5 Questionnaire Design

Questionnaire design is a substantial step and is considered one of the challenging tasks in research design (Beins, 2009). Two crucial elements of the questionnaire must be taken into account. Firstly, the questionnaire’s contents should align with the research questions and research objectives. These substances should be supported by academic literature. Secondly, the format of the questionnaires should consider the

sequence and wording of the question and the response selection (Synodinos, 2003). In this study, the questions' wording and instructions were formulated to be understood and easy to read. Furthermore, close-ended or open-ended questions were engaged to facilitate quick response and analyse the data (Sekaran, 2006). The participants were asked to choose the required answer on a five-point Likert scale.

English is the original language of the items (see Appendix D-1). However, in the Dubai Police, all participants spoke Arabic and were not familiar with English to answer the questionnaire. Therefore, all items were translated into the Arabic language (see Appendix D-2). Brislin (1986) recommended translating back the questionnaire into English to measure reliability and validity. Accordingly, two bilingual persons were recruited to translate and back translate the items. The back translation was essential to detect any modifications and changes by comparing two English versions. The questionnaire had 103 questions divided into six parts (see Appendix D-1). The first part aimed to measure organisational performance; the second part had questions on Six Sigma, the third part on Kaizen, and fourth part benchmarking. The fifth part measured innovation culture while the last section had demographic questions.

#### **4.6 Pilot Study**

A pilot test is carried out before data collection to ensure that errors in the questionnaire could be reduced. A pilot test is an instrument that predetermines the condition of the questionnaire and guarantees that the questions are clear to the participants in light of how it is worded and its measurement (Sekaran, 2003). It is advisable to resolve issues including bias before the administration of the questionnaire to the actual participants.

According to Roscoe (1975), the appropriate sample size for a pilot study should be more than 30 and does not exceed 500. In the pilot study, a drop-off delivery of the questionnaire to 88 randomly selected head section officers was administered. Of 88, only 62 questionnaires were returned. The response rate was 70.5 per cent.

Before conducting the pilot study, the researcher employed a pre-test evaluation to validate the instruments by conducting a pilot study. Validity points to what extent the measurement scales measure what is proposed to measure (Nunnally & Bernetein, 1994). Several techniques are available for validating measures. Content validity is one of common measures, which relies on several experts to make a judgmental evaluation that the items of measurement contain the construct measure of all its aspects. Before collecting the real data, the questionnaire was carefully evaluated and examined by the supervisor, academics, and practitioners. Three academics and two practitioners were asked to provide feedback to the items, particularly on the wording, instructions etc. to ensure they were clear.

#### **4.6.1 Measuring of the Reliability and Validity**

Reliability refers to an estimation of the consistency level among multiple measurements of a variable (Hair et al., 2010). In this research, reliability was conducted to gauge the consistency of the items of each construct. Sekaran (2003) identified four common approaches employed to measure the reliability of constructs: alternative form approach, split half approach, test-retest approach, and Cronbach's alpha coefficient approach. However, Cronbach's alpha coefficient is an effective method and used in many research investigations (Sekaran, 2003). It can overcome the disadvantages of other approaches. This research used Cronbach's alpha to test the reliability of each variable separately. For exploratory research, Nunnally (1978)

suggested 0.7 as the minimum value of Cronbach's alpha. Table 4.10 shows that the value of all constructs was above 0.70, suggesting that the items were reliable.

Table 4.10  
*Reliability Analysis of Pilot Study*

Constructs	No. of original items	Cronbach's Alpha	Item deleted*	Cronbach's Alpha if item deleted
Organizational Performance	23	0.949	Nil	0.949
Six Sigma	20	0.951	Nil	0.951
Kaizen	21	0.963	Nil	0.963
Benchmarking	18	0.956	Nil	0.956
Innovation Culture	21	0.967	Nil	0.967

#### 4.6.2 Exploratory Factor Analysis

To examine the construct validity of the measurements, an exploratory factor analysis (EFA) was conducted. EFA is an interdependent technique which mainly seeks to describe the underlying structure among the constructs in the analysis (Hair et al., 2010). This analysis aims at testing the interrelationships among the latent variables and confirm the consistency of the extracted factors with their original and theoretical form (StataCorp, 2013). According to Hair et al. (2010), Bartlett's test of sphericity (BTS) and the Kaiser-Meyer Olkin's (KMO) measure of sampling are two common tests employed to examine the correlations of the variables. The KMO is an index used to compare the magnitude of the observed correlation coefficient to the partial correlation coefficient (StataCorp, 2013). Pallant (2005) recommended fulfilling some criteria for factor analysis. He recommended that KMO should be higher than 0.5, BTS should be significant, and an eigenvalue should be higher than one.

Table 4.11 shows that the KMO ranged between 0.789 and 0.865, suggesting that factor analysis was suitable. The BTS value was also highly significant ( $p=0.000$ ) indicating that the factor analysis was reliable and relevant. The eigenvalue was higher than one. Besides, factor loadings of the items were tested, and most of them were between 0.505 and 0.899, which were acceptable and retained as recommended by Hair et al. (2010).

Table 4.11  
*Factor Analysis and Reliability of the Final Instrument (Pilot Study)*

Constructs	No of Items	Factor loading for items in first factor*	KMO	Eigen-Value	% of Variance
Organizational Performance	23	.507, .539, .717, .537, .716, .784, .839, .784, .775, .856, .803, .636, .718, .791, .572, .809, .726, .592, .647, .595, .608, .688, .699	0.789	11.278	49.037
Six Sigma	20	.718, .743, .710, .763, .751, .718, .811, .811, .713, .737, .795, .662, .799, .732, .740, .592, .568, .630, .739, .717	0.853	10.519	52.593
Kaizen	21	.657, .505, .719, .620, .715, .786, .529, .644, .725, .749, .752, .851, .869, .831, .784, .862, .871, .879, .827, .843, .838	0.865	12.219	58.186
Benchmarking	18	.735, .715, .741, .745, .839, .619, .794, .633, .751, .785, .846, .826, .860, .790, .742, .780, .756, .716	0.877	10.459	58.106
Innovation Culture	21	.764, .764, .644, .877, .806, .740, .852, .820, .861, .804, .516, .899, .745, .808, .761, .857, .753, .772, .735, .808, .798	0.863	12.925	61.547

## **4.7 Techniques of Data Analysis**

To accomplish the objectives of the study, SPSS version 23 and PLS-SEM version 3.0 were employed as statistical techniques for analysing the data. In the beginning, survey responses including the participants' profile and response rates were analysed by using SPSS. The SPSS was also used to perform data screening, and the data were checked for multicollinearity, normality, outliers, missing data, and response bias. PLS-SEM was used as the primary analytical tool to investigate the measurement and structural models. The following section discusses the reason for using PLS-SEM.

### **4.7.1 Employing Partial Least Squares Structural Equation Modelling (PLS-SEM)**

PLS modelling is a conventional method that predicts the causal relations in the path models that contain latent constructs measured indirectly by various factors (Wold, 1982). This tool works efficiently with structural equation models that consist of latent variables and a chain of cause-and-effect relations (Gustafsson & Johnson, 2004). It is considered an efficient and flexible method for prediction and statistical model building (Ringle, Wende & Will, 2005).

There are two approaches to describe the PLS path model: a structural model and a measurement model. While the measurement model links manifest variables, the structural model connects the endogenous latent variables to the latent variables. In other words, the measurement model indicates the outer model which describes the link between the latent variable and its manifest variable, whereas the structural model demonstrates the inner model which represents the link between the latent variables.

The PLS analysis technique was employed in this study for the following reasons:

- It provides a valid, more meaningful and accurate results than other analytical techniques (Bollen, 1989).
- It can deal with large and complex models (Akter D'Ambra & Ray, 2011) which suited this study that examined the relationship between five variables.
- SEM is considered a superior and accurate model that can be used to conduct estimations better than regressions for assessing mediation role (Brown, 1997; Mattanah, Hancock, & Brand 2004; Preacher & Hayes, 2004)
- In social sciences, data tend to have a normality problem (Osborne, 2010). This issue could be treated relatively well with PLS.

To assess the models of PLS, two primary methodological approaches have to be considered (Hair, Hult, Ringle & Sarstedt, 2014; Fernandes, 2012). To evaluate the measurement, the internal consistency, the unidimensionality of the constructs, the convergent validity of the measures associated with the constructs, and their discriminant validity have to be checked. The rule-of-thumb is as follows:

- **Construct Validity:** Indicator loadings should be greater than 0.50.
- **Convergent Validity:** Hair et al. (2014) proposed using the Average Variance Extracted (AVE) as it has become a rule of thumb to verify the convergent validity on the construct level. The AVE of each latent construct should be higher than 0.50 for establishing adequate convergent validity (Hair et al., 2014; Valerie, 2012).

- **Discriminant Validity:** Heterotrait-Monotrait (HTMT) ratio are used to establish discriminant validity. According to Henseler, Ringle, and Sarstedt (2015), the value of HTMT should be less than one while Gold, Malhotra, and Segars (2001) suggested the value should be lower than 0.90. However, Kline (2010) proposed a value below 0.85.
- **Internal Consistency Reliability:** Cronbach's alpha and composite reliability (CR) are employed to test the internal consistency reliability. The threshold for both measures should be 0.70 or above.

To evaluate the structural model, the following criteria are recommended:

- **R-square ( $R^2$ ):** The  $R^2$  criterion is considered an essential requirement for evaluating the structural model in PLS-SEM. Hair et al. (2014) recommended the value of  $R^2$  to be more than 0.75 to represent a substantial, 0.50 moderate, and 0.25 weak model.
- **Effect Size ( $f^2$ ):** The  $f^2$  analysis is employed to identify the effect size of certain latent variables on the dependent latent variables. According to Cohen (1988; 2013), the value of 0.35 refers to a large effect size, 0.15 means a medium effect, and 0.02 a small effect.
- **Predictive Relevance of the Model ( $Q^2$ ):** The blindfolding procedure is designed to assess the quality of the model by removing certain amounts of the data and consider them as missing values to estimate the model parameters. A positive result of  $Q^2$  means that the model has predictive validity while the

model does not have predictive validity if the result of  $Q^2$  is negative (Tenenhaus, 1999).

- **Goodness of Fit (GoF) of the Model:** GoF is measured by identifying the geometric mean of the AVE and the average  $R^2$  for the endogenous variables (Tenenhaus, Esposito, Chatelin, & Lauro, 2005). Three values to describe the GoF are 0.10, 0.25, and 0.36 for small, medium, and large respectively (Wetzels, Odekerken-Schroder & Oppen, 2009).
- **Hypothesis Testing:** Bootstrapping is employed to evaluate the significance of path coefficients. PLS has been employed with a number of 5000 bootstrap samples.

#### 4.8 Summary

This chapter discussed the methodology of the study. This study was correlational because it investigated the correlation between the variables under investigation as well as the mediation impact. This chapter also talked about sampling, population, and method employed in this study.

## **CHAPTER FIVE**

### **DATA ANALYSIS AND FINDING**

#### **5.1 Introduction**

The present chapter presents the findings of the data analysis. Descriptive and inferential statistical results were analysed using PLS-SEM and SPSS. This chapter begins by showing the findings of the preliminary analysis including participants and data screening analysis. Then, the results of the evaluation of the measurement and structural models which include reliability analysis, convergent validity, discriminant validity, predictive relevance of the model, effect size, goodness of fit (GoF), hypothesis testing, and the mediation of innovation culture are offered.

#### **5.2 Analysis of Survey Response**

##### **5.2.1 Response Rate**

The researcher distributed questionnaires to 338 head section officers in the Dubai Police. The questionnaires were distributed via a drop-off survey and online throughout three months from March 2018 to May 2018. Of 338 distributed, 252 questionnaires were returned.

To handle incomplete responses, Hair et al. (2010) suggested removing the case participant if the missing data are greater than 50 per cent. The study found less than 50 per cent of missing data from the returned responses. Thus, 252 usable responses

were used for further analysis, yielding an overall response rate of 74.5 per cent as shown in Table 5.1.

Table 5.1  
*Response Rate According to Data Collection Method*

Data Collection Method	Drop-off Questionnaires	Online Questionnaires	Total
No. of Questionnaires	338	117*	338
Questionnaires Returned	221	31	252
Response Rate	65.38%	26.5%	74.5%

\* Online questionnaire had distributed after complete drop-off questionnaire

The response rate of each department in the Dubai Police is shown in Table 5.2. It shows that the highest response rate was recorded by the General Department of Operation (100%), while the lowest response rate was recorded by the General Department of Punitive and Correctional Establishments (53.3%).

Table 5.2  
*Number of Samples That Have Been Collected from All Departments*

Respondents' Department	No. of Sections	Distributed	Returned	
			Sum	Percentage
General Department of Criminal Investigation	97	39	28	71.8%
General Department of Forensic Science and Criminology	46	19	15	78.9%
General Department of Airports Security	53	21	14	66.7%
General Department of Traffic	38	15	11	73.3%
General Department of Anti Narcotic	28	11	8	72.7%
General Department of Operation	33	13	13	100.0%

Table 5.2 (continued)

General Department of Administrative Affairs	18	7	5	71.4%
General Department of Human Rights in Dubai Police	22	9	7	77.8%
General Department of Punitive and Correctional Establishments	36	15	8	53.3%
General Department of Organizations Protective Security and Emergency	33	13	11	84.6%
General Department of Human Resources	31	13	10	76.9%
General Department of Services and Supplies	47	19	14	73.7%
General Department of Excellence and Pioneering	49	20	17	85.0%
General Department of Artificial intelligence	27	11	9	81.8%
General Department of Finance	16	7	4	57.1%
General Department of Community Happiness	35	14	12	85.7%
Future Foresight and Decision-Making Support Center	24	10	7	70.0%
Dubai Police Academy	58	23	18	78.3%
General Department of Training	20	8	5	62.5%
Head Quarter's Regulatory Office	24	10	7	70.0%
General Department of Transport and Rescue	28	11	6	54.5%
Police Stations	74	30	23	76.7%
Total	837	338	252	74.5%

### 5.2.2 Test of Non-Respondent Bias

Evidence from previous studies indicated that sometimes a difference between non-participants and participants in their motivations, personalities, behaviours, and attitudes which might impact the results of the research existed (Malhotra, Hall, Shaw, & Oppenheim, 2006). To address such issue, t-test and Levene's test were employed to examine non-response and response bias and test of the early and late responses of variables. Several researchers including Malhotra et al. (2006) and Churchill and Brown (2004) pointed out that late participants could be utilised instead of non-participants, mainly because the former may not have responded if they have not been followed up. According to Malhotra et al. (2006), non-participants are considered to possess similar characteristics as late participants. The sample of this study was classified into two sets namely early responses and late responses with the former being those who returned the questionnaires from the drop-off method the latter who returned from the online survey. Hence, 221 participants were grouped into early responses and 31 as late responses. Descriptive as well as Levene's test were conducted for equality of variance on the main variables of the study.

Table 5.3 displays no significance values, which were higher than 0.05. The values implied that the variances were assumed to be nearly equal. Additionally, the two groups were found to come from the same population since there were no significant differences between early and late participants for the main variables except Six Sigma. In this case, according to Clancy and Gove (1974), there are no significant steps to be taken to alleviate response bias because it does not contribute to a significant effect on the study. Furthermore, a study affected by response bias still often contributes to high reliability (Gove & Geerken, 1977). Besides, Pallant (2013)

stated that the alternative t-value compensates for the fact that the same variances are not used. Since non-response bias was not a serious issue in the current research, both early and late responses were used in the final analysis. Detailed results are available in Appendix (E).

Table 5.3  
*Test of Non-Respondent Bias*

Variables		N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means	
				F	Sig.*	t	Sig.* (2-tailed)
Organizational Performance	Early	221	3.996	1.101	0.295	-0.671	0.503
	Late	31	4.070			-0.606	0.548
Six Sigma	Early	221	4.075	5.298	0.022	0.446	0.656
	Late	31	4.022			0.360	0.721
Kaizen	Early	221	3.858	0.039	0.844	-0.638	0.524
	Late	31	3.938			-0.618	0.540
Benchmarking	Early	221	4.229	1.691	0.195	0.738	0.461
	Late	31	4.142			0.601	0.552
Innovation Culture	Early	221	4.134	0.617	0.433	0.231	0.817
	Late	31	4.107			0.209	0.835

\*P < 0.05

### 5.3 Data Screening and Preliminary Analysis

Before applying the necessary data analysis techniques, data screening analysis is necessary because of the direct effect of data distribution on tests used for analysis (Byrne, 2010). Even though this research employed SmartPLS to assess the quality of the model and test the hypothesised relationships, which has no concern about data distribution, data screening was still applied so that the nature of the distribution of the

data could be recognised. In this procedure, descriptive analysis, detection and treatment of missing data, outliers, normality and multicollinearity test were run.

### **5.3.1 Descriptive Statistics Analysis**

Descriptive statistics are run to investigate and recapitulate the data collected in order to describe it within the context of the study. This analysis aims to show the different attributes of data, verifying any violation of the principal assumptions for the statistical methods to be employed in the research, and addressing specific research questions (Pallant, 2007). In this research, the descriptive statistics were performed by employing percentage and variation statistics such as standard deviation and means.

#### **5.3.1.1 Descriptive Statistics of Demographic Items**

The demographic variables gender, experiences, qualifications, related department, and training were analysed. Table 5.4 shows that the majority of participants were male (79.4%). Close to half of the participants completed high school (45.6%), followed by those who had a college degree (39.7%), a graduate degree (9.5%), and those who did not finish high school (5.2%). In terms of experiences, the majority had ten years of work experience (58.5%), followed by those who had 0-5 years of experience (24.2%), and 6-9 years of work experience (17.1%). The data also showed that 31.7 per cent, 7.94 per cent, and 15.1 per cent had undergone training in Six Sigma, Kaizen, and benchmarking respectively.

Table 5.4  
*Participants' Demographic Information*

Demographic Variable	Category	Frequency (N=252)	Percentage
Gender	Male	200	79.4%
	Female	52	20.6%
Qualifications	Under High School	13	5.2%
	High School	115	45.6%
	College Degree	100	39.7%
	Graduate Studies	24	9.5%
Experiences	0-5 Years	61	24.2%
	6-9 Years	43	17.1%
	10 Years or more	148	58.7%
Training on Six Sigma	Yes	80	31.7%
	No	172	68.3%
Training on Kaizen	Yes	20	7.94%
	No	232	92.06%
Training on Benchmarking	Yes	38	15.1%
	No	214	84.9%

### 5.3.1.2 Descriptive Statistics of Study Constructs

Other descriptive statistics in the form of minimum, maximum, mean, and standard deviations were computed for Six Sigma, Kaizen, benchmarking, and organisational performance. As indicated earlier, all constructs were measured on a five-point Likert scale where '1' represents "strongly disagree" (the minimum value) and '5' "strongly agree" (the maximum value).

To facilitate interpretation, this study used three categories, namely low when the values were less than 2.33, high when the values were more than 3.67, and moderate when the scores were between low and high (Noor & Kumar, 2014). The overall mean for the constructs ranged from 3.98 to 4.18, suggesting that all constructs had a high value (see Table 5.5). Table 5.5 also shows that the minimum value of the constructs

ranged from 1.11 to 1.81 and the maximum value was 5.00. The data also revealed that benchmarking had the highest mean value of 4.18 with the highest standard deviation (SD) of 0.659. These results indicated that the officers of the Dubai Police gave attention to benchmarking. The second highest value of mean was Six Sigma (4.04) with a standard deviation of 0.630, followed by Kaizen (mean=3.86; SD=0.645). Innovation culture showed a mean value of 4.18 and SD of 0.645, which means that the Dubai Police officers had a high awareness of the importance of innovation culture. Finally, the mean value of organisational performance was 3.98 with a SD of 0.587.

Table 5.5  
*Descriptive Statistics of the Constructs (n=252)*

Variables	N Statistic	Minimum	Maximum	Mean Statistic	Std. Deviation Statistic
Organizational Performance	252	1.65	5	3.98	0.587
Six Sigma	252	1.35	5	4.04	0.630
Kaizen	252	1.81	5	3.86	0.645
Benchmarking	252	1.11	5	4.18	0.659
Innovation Culture	252	1.38	5	4.18	0.645

### 5.3.1.3 Descriptive Statistics of the Departments

To assess the level of Six Sigma, Kaizen, and benchmarking implementation in general departments and police stations of the Dubai Police, a mean value was used. Table 5.6 shows that the mean value of Six Sigma ranges from 3.465 to 4.519 with standard deviation ranges between 0.429 and 0.947.

The mean of Kaizen ranges between 3.480 and 4.290 with SD ranging from 0.492 to 0.825. Also, the mean value of benchmarking ranged between 3.745 and 4.530 with

SD between 0.337 and 1.151. The mean value of Six Sigma, Kaizen, and benchmarking was 4.040, 3.856, and 4.181 respectively.

Table 5.6 also shows that the highest mean score of Six Sigma was recorded by the General Department of Anti Narcotic (4.486), followed by the Headquarters Regulatory Office (4.486). On the other hand, the lowest score of the mean was recorded by the General Department of Human Resources (3.465) and the General Department of Punitive and Correctional Establishments (3.726).

Kaizen recorded the lowest value of mean in comparison with other tools (3.856). The highest value of mean was achieved by the General Department of Anti Narcotic (4.290) and the General Department of Operation (4.262), while the lowest values were recorded by the General Department of Human Resources (3.480) and the General Department of Training (3.587).

Benchmarking recorded the highest overall mean (4.181) among Six Sigma and Kaizen. The highest value was achieved by the Headquarters Regulatory Office (4.476), followed by 4.472 recorded by the General Department of Anti Narcotic. The smallest score of the mean was 3.745 and 3.808 recorded by the General Department of Human Resource and the General Department of Traffic respectively.

The findings revealed that some departments achieved a high level of implementation Six Sigma, Kaizen, and benchmarking. For instance, the General Department of Anti Narcotic recorded the highest value of mean in Six Sigma (4.486) and Kaizen (4.290) and achieved the second highest value in Kaizen (4.472). However, the General Department of Human Resource recorded the lowest score of mean in Kaizen and benchmarking at 3.480 and 3.745 respectively.

These findings indicate that the agreement between the Dubai Police' head section officers about the implementation of Six Sigma, Kaizen, and benchmarking was different. However, it can be said that the Dubai Police has been implemented these tools at a high level.

Table 5.6  
*Descriptive Statistics of the Dubai Police's Departments (n=252)*

Department	Statistics	Six Sigma	Kaizen	Benchmarking
Head Quarter's Regulatory Office	Mean	4.486	3.980	4.476
	SD	0.433	0.693	0.482
General Department of Anti Narcotic	Mean	4.519	4.290	4.472
	SD	0.429	0.629	0.414
General Department of Human Rights in Dubai Police	Mean	4.179	3.918	4.238
	SD	0.483	0.537	0.485
General Department of Community Happiness	Mean	4.250	4.119	4.347
	SD	0.492	0.607	0.408
General Department of Airports Security	Mean	3.971	3.887	4.274
	SD	0.661	0.562	0.980
General Department of Administrative Affairs	Mean	4.220	3.705	4.044
	SD	0.751	0.492	0.734
General Department of Finance	Mean	3.813	3.595	3.917
	SD	0.602	0.825	0.827
General Department of Artificial intelligence	Mean	4.161	4.064	4.230
	SD	0.621	0.612	0.626
General Department of Forensic Science and Criminology	Mean	4.267	4.101	4.415
	SD	0.547	0.655	0.616
Dubai Police Academy	Mean	4.108	3.877	4.237
	SD	0.724	0.755	0.631
General Department of Criminal Investigation	Mean	3.819	3.615	4.018
	SD	0.431	0.549	0.484
General Department of Excellence and Pioneering	Mean	4.113	3.992	4.346
	SD	0.534	0.582	0.440
General Department of Services and Supplies	Mean	4.050	3.707	4.334
	SD	0.638	0.527	0.610
General Department of Operation	Mean	4.308	4.262	4.530
	SD	0.733	0.761	0.809
General Department of Transport and Rescue	Mean	4.475	4.175	4.491
	SD	0.437	0.618	0.544

Table 5.6 (continued)

General Department of Punitive and Correctional Establishments	Mean	3.726	3.818	4.132
	SD	0.601	0.573	0.445
General Department of Traffic	Mean	4.014	3.780	3.808
	SD	0.903	0.794	1.151
General Department of Human Resources	Mean	3.465	3.480	3.745
	SD	0.947	0.629	0.901
General Department of Organizations Protective Security and Emergency	Mean	3.884	3.624	3.858
	SD	0.501	0.694	0.675
Future Foresight and Decision-Making Support Center	Mean	3.876	3.768	3.863
	SD	0.414	0.737	0.337
General Department of Training	Mean	3.792	3.587	4.259
	SD	0.695	0.788	0.437
Police stations	Mean	3.875	3.701	4.006
	SD	0.554	0.513	0.551
Total	Mean	4.040	3.856	4.181
	SD	0.630	0.645	0.659

### 5.3.1.4 Descriptive Statistics of Training

Table 5.7 below depicts the descriptive results of training at each department in Six Sigma, Kaizen, and benchmarking. It was revealed that 31.7 per cent, 7.94 per cent, and 15.1 per cent reported to training in Six Sigma, Kaizen, and benchmarking respectively. Of 22 departments and police stations, the General Department of Transport and Rescue recorded the highest percentage of training courses in Six Sigma (66%), followed by the General Department of Anti Narcotic (62.5%). The participants from the General Department of Finance, General Department of Operation, General Department of Punitive and Correctional Establishments, and General Department of Punitive and Correctional Establishments did not receive any training on Six Sigma.

The highest percentage of training on Kaizen was recorded by the General Department of Anti Narcotic (25%) and General Department of Operation (23.1%). The participants from the General Department of Community Happiness, the General

Department of Administrative Affairs, the General Department of Finance, the General Department of Criminal Investigation, the Future Foresight and Decision Making Support Centre, the General Department of Training, and police stations did not report any training in Kaizen.

Both the General Department of Forensic Science and Criminology and the General Department of Transport and Rescue recorded the highest percentage of training in benchmarking (each 33.35) while the lowest percentage recorded by the General Department of Administrative Affairs, the General Department of Finance, the General Department of Traffic, and the General Department of Human Resources.

Table 5.7  
*Training in Six Sigma, Kaizen, and Benchmarking*

Department	N	Six Sigma		Kaizen		Benchmarking	
		Sum	%	Sum	%	Sum	%
Head Quarter's Regulatory Office	7	4	57.1%	1	14.3%	2	28.6%
General Department of Anti Narcotic	8	5	62.5%	2	25.0%	2	25.0%
General Department of Human Rights in Dubai Police	7	3	42.9%	1	14.3%	1	14.3%
General Department of Community Happiness	12	3	25.0%	0	0.00%	2	16.7%
General Department of Airports Security	14	3	21.4%	2	14.3%	3	21.4%
General Department of Administrative Affairs	5	1	20.0%	0	0.00%	0	0.00%
General Department of Finance	4	0	0.00%	0	0.00%	0	0.00%
General Department of Artificial intelligence	9	2	22.2%	1	11.1%	1	11.1%
General Department of Forensic Science and Criminology	15	8	53.3%	1	6.67%	5	33.3%
Dubai Police Academy	18	7	38.9%	1	5.56%	2	11.1%
General Department of Criminal Investigation	28	9	32.1%	0	0.00%	3	10.7%
General Department of Excellence and Pioneering	17	9	52.9%	2	11.8%	3	17.6%
General Department of Services and Supplies	14	7	50.0%	1	7.14%	3	21.4%
General Department of Operation	13	0	0.0%	3	23.1%	4	30.8%
General Department of Transport and Rescue	6	4	66.7%	1	16.7%	2	33.3%
General Department of Punitive and Correctional Establishments	8	0	0.00%	1	12.5%	1	12.5%
General Department of Traffic	11	3	27.3%	1	9.09%	0	0.00%

Table 5.7 (continued)

General Department of Human Resources	10	1	10.0%	1	10.0%	0	0.00%
General Department of Organizations	11	0	0.00%	1	9.09%	1	9.09%
Protective Security and Emergency Future Foresight and Decision-Making Support Center	7	2	28.6%	0	0.00%	1	14.3%
General Department of Training	5	2	40.0%	0	0.00%	1	20.0%
Police stations	23	7	30.4%	0	0.00%	1	4.35%
Total	252	80	31.7%	20	7.94%	38	15.1%

#### 5.4 Treatment of Missing Data

Missing data is an issue because they could affect the findings of the study (Cavana et al., 2001). PLS-SEM would not work well if there any missing values. In this study, 77 returned questionnaires (30.5%) had missing values. In total, there were 340 missing values, ranging from one to five in each questionnaire. These missing values were treated using SPSS by replacing them with mean substitution as recommended by Hair, Black, Babin, Andersen, and Tatham (2006). That is, 340 missing values were replaced with the mean of nearby values (see Appendix F).

#### 5.5 Removing Outliers

Outliers are any observations that are statistically distant if compared to the rest of the dataset (Byrne, 2010). Numerous approaches are available to identifying outliers within a particular study, among which includes classifying data points based on an observed (Mahalanobis) distance from the study estimated values (Hair et al., 2006). Part of the constructive arguments in favour of outlier treatments based on Mahalanobis distance is that it serves as an effective means of detecting outliers through the settings of some predetermined threshold that will assist in defining whether a point could be categorized as outlier or not (Hair et al., 2006).

In this research, an equation in SPSS was used as the threshold value to determine the empirical optimal values at level 0.001 and four degrees of freedom. Hair et al. (2010) proposed adding a new variable in the SPSS named "response" to denote the beginning to the end of all variables. The Mahalanobis can simply be accomplished by employing a simple linear regression test by selecting the newly created response number as the dependent variable and selecting all measurement items apart from the demographic variables as the independent variables. A new output was called "MAH\_1". A new response number called "Probability\_MD" was created to identify outliers based on four degrees of freedom. Based on the outputs, seven cases were identified as outliers (149, 160, 176, 182, 185, 227, and 243) and were subsequently removed from the dataset. Sequel to the treatment of these outliers, the final analysis in this study was done using the remaining 245 samples in the data. All related results are available in Appendix G.

## 5.6 Normality Test

Normality is employed to present a symmetrical curve that has the greatest frequency of scores in the middle and smaller frequencies towards the extremes (Pallant, 2005). For evaluating the normality of the distribution of scores for the independent and dependent variables, Pallant (2005) and Kline (1998) proposed assessing the value of skewness and kurtosis of such variables. Because of the nature of the variables in social sciences, several scales and measures may have some scores, which by nature, may be positively or negatively skewed (Pallant, 2005). Kurtosis is another feature in the form of a distribution representing the degree to which, for a given standard deviation, observations gather around a central mean.

This research examined multivariate normality using the WebPower tool (Zhang & Yuan, 2018) available online. This tool identified Mardia's multivariate skewness, kurtosis coefficients, and p-values. Table 5.8 shows that Mardia's multivariate skewness was ( $\beta = 8.497$ ,  $p < 0.01$ ) and Mardia's multivariate kurtosis was ( $\beta = 61.76$ ,  $p < 0.01$ ), which confirmed multivariate non-normality.

According to Byrne (2010), normality is an issue because it is one of the basic assumptions required to carry out structural equation modelling (SEM) analysis. However, this problem is much less severe when using PLS-SEM (Hair et al., 2013). PLS-SEM was chosen in this study as it is a nonparametric analysis software which also employs the bootstrapping method in determining the significant relationship within a model for non-normal data. This is one of the major advantages of using PLS-SEM. Unlike other SEM techniques, PLS-SEM does not require any normality assumption and handles non-normal data rather well (Bontis, Booker, & Serenko, 2007; Chin, 1998).

Table 5.8  
*Results of Skewness and Kurtosis for Normality Test*

Univariate skewness and kurtosis				
	Skewness	SE_skew	Kurtosis	SE_kurt
Organizational Performance	-0.4608767	0.1533954	0.7151109	0.305614
Six Sigma	-0.7086076	0.1533954	1.2146281	0.305614
Kaizen	-0.2199994	0.1533954	-0.1466313	0.305614
Benchmarking	-1.0737103	0.1533954	2.1410759	0.305614
Innovation Culture	-0.6825807	0.1533954	0.8584528	0.305614
Mardia's multivariate skewness and kurtosis				
	b	z	p-value	
Skewness	8.497608	356.89952	0.00	
Kurtosis	61.762597	25.38923	0.00	

## 5.7 Multicollinearity Test

It is highly recommended to test multicollinearity among the independent variables of the study before testing the study's model (Hair et al., 2010). Multicollinearity occurs when there is a higher linear correlation among two or more independent variables in a multiple regression test (Hair et al., 2014). If only two independent variables are involved, it is called collinearity (Hair et al., 2014). The existence of multicollinearity among the exogenous latent variables produces estimation problem which results in a poor or "strange" estimate of the regression coefficient, large standard error, and reduced power of the statistical test of the interaction (Hayes, 2013).

To detect the multicollinearity, tolerance value, variance influence factor (VIF), and Pearson correlation can be performed. This study used both tolerance value and variance influence factor (VIF) as they have been widely used by researchers (O'Brien, 2007) in addition to the Pearson correlation method. According to Hair et al. (2014), the threshold values for both the tolerance value and variance inflation factor (VIF) are 0.20 and 5.00 respectively, and whenever the value of tolerance is above 0.20, and the value of VIF is less than 5.00, this indicates that multicollinearity is not an issue. Table 5.9 suggests no multicollinearity as the values of tolerance ranged between 0.244 and 0.416 and the values of variance influence factor ranged between 2.405 and 4.100. Thus, it can be confidently reported that there was no multicollinearity among the independent variables.

Table 5.9  
*Multicollinearity Test*

Model	Collinearity Statistics	
	Tolerance	VIF
Six Sigma	0.268	3.735
Kaizen	Organizational Performance	0.403
Benchmarking		0.244
Innovation Culture		3.827
Six Sigma		3.647
Kaizen	Innovation Culture	0.416
Benchmarking		2.558

The other method to detect multicollinearity is the Pearson correlation. Hair et al. (2010) suggested that if the significant correlation between the independent variables has a value greater than 0.90, then this indicates the existence of multicollinearity.

As shown in Table 5.10, the values of the Pearson correlation were less than the cut-off point of 0.90, suggesting no multicollinearity between the predicted variables.

Table 5.10  
*Pearson Correlation Test*

	Six Sigma	Kaizen	Benchmarking	Innovation Culture
Six Sigma	1			
Kaizen	.762**	1		
Benchmarking	.778**	.633**	1	
Innovation Culture	.751**	.656**	.841**	1

\*Correlation is significant at the 0.01 level (2-tailed)

## 5.8 Common Method Variance Test

Common method variance (CMV) refers to variance attributable to the measurement method rather than to the construct of interest (Podsakoff, MacKenzie, Lee, &

Podsakoff, 2003). In research, variations remain a potential problem once the same persons give self-reported data to assess items for the dependent and independent variables (Podsakoff et al., 2003; Richardson, Simmering, & Sturman, 2009). CMV is widely acknowledged by researchers as a measurement error problem that could inflate or deflate the observed links between variables generating type I and type II errors (Campbell, 1982; Lindell & Whitney, 2001; Podsakoff et al., 2003; Spector, 2006).

As this study gathered information from a single participant, there was the possibility of common method variance. As suggested by Podsakoff et al. (2003) and Chang, van Witteloostuijn, and Eden (2010), the researcher administered pre- and post-remedies to minimise the impact of CMV. As for the pre remedy, different scale types were employed. After data collection, the researcher conducted a post-remedy to verify whether a significant amount of CMV was still a threat. The most widely used technique to inspect whether variations in the data occurred primarily due to a single factor is Harman's single factor test. According to Podsakoff and Organ (1986), this technique assumes that a common bias occurs in the data if a single factor appears from factor analysis for all items in the study. CMV is also a threat if a general factor represents the most common variation in the existing data.

To check for CMV, the researcher used SPSS to perform Harman's single factor test. The test procedure involved loading all items for exploratory factor analysis and examined the unrotated factor solution by using the factors to extract one criterion. The analysis showed that the first factor contributed only 44.8 per cent of the variance to the data which was below 50 per cent as suggested by Kumar (2012). Hence, it was concluded that CMV was not a threat to this study. The result of this test is shown in Appendix I.

## 5.9 Post-Hoc Power Analysis

Power analysis can be valuable to determine the sample size during the design stage of a study. It can also be used after the data have been analysed and especially when insignificant results occurred (Aktas & Keskin, 2013). The technique can be used to statistically evaluate insignificant findings occurred in the relationship between the variables. Statistically, insignificant results may happen due to insufficient power as a result of insufficient sample size and a less than meaningful effect size (Balkin & Sheperis, 2011). Shortage of power may lead to erroneous decisions concerning the null hypothesis (Aktas & Keskin, 2013). A deficiency in power increases the probability that a type II error will occur. Put differently; low power increases the likelihood that a researcher will decide to retain a false null hypothesis (Aktas & Keskin, 2013).

To empirically validate the finding of this study, a *post-hoc* power analysis was conducted by using G\*Power 3.1.9.2 software (Faul et al., 2007). Three parameters were used: the significance level ( $\alpha=0.05$ ), the sample size (252), and a medium effect size  $f^2$  (0.15) with three main predictor variables. For a high degree of probability of significant result to be achieved, it is suggested that the power of statistical tests should equal or above 0.8 (Baroudi & Orlikowski, 1989; Cohen 1988; Faul et al., 2009; Hair et al., 2014). As shown in Figure 5.4, the results indicated statistical power of 0.99, which means that the sample size of 252 in this study was able to achieve the adequate level of power at 0.05 significance level. The alpha-value of 0.05 seems to be appropriate to judge the statistical significance of the analysis (Carbonell & Rodríguez-Escudero, 2016) and therefore any insignificant relationship can be considered not related to the sampling and measurement error.

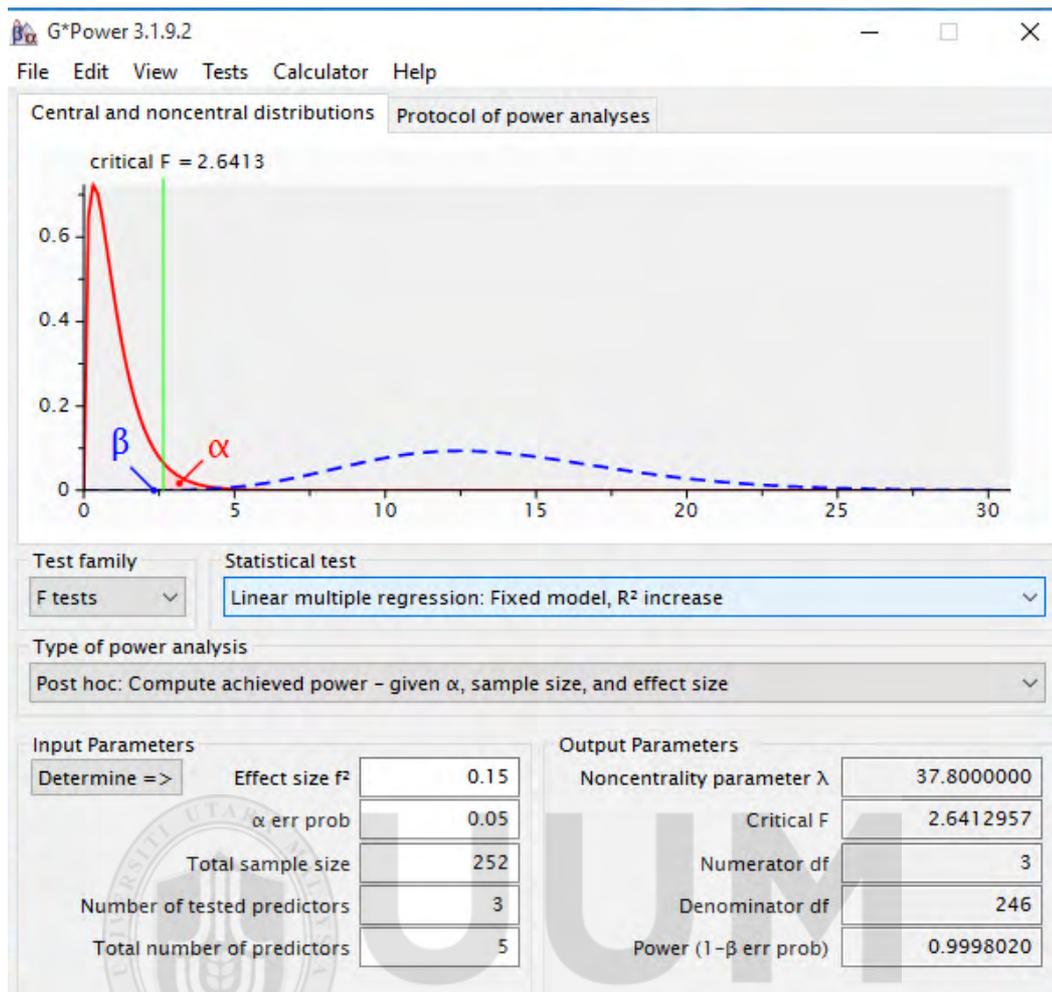


Figure 5.1  
A Post-Hoc Power Analysis

## 5.10 Evaluation of the Model Quality

The quality model assessment was done using the software package PLS-SEM version 3.0 (Ringle, Wende, & Becker, 2014). This software has been widely used by many researchers from different disciplines, such as marketing, strategic management, management information system, organisational behaviour, and customer behaviour (Henseler, Ringle, & Sinkovics, 2009). To use PLS-SEM, it is crucial to conduct advanced analyses which extend the initial PLS-SEM findings to get a valid and complete understanding of the results (Hair et al., 2014). In doing so, the study adopted the two-step process, namely measurement model evaluation and structural model

evaluation to assess and interpret the results of the PLS path model (refer to Hair, Sarstedt, Ringle, & Mena, 2012; Hair et al., 2014; Henseler et al, 2009; Lewis, Templeton & Byrd, 2005; Straub, Boudreau, & Gefen, 2004; Urbach & Ahlemann, 2010). Figure 5.1 shows the two-step process of quality model evaluation.

Figure 5.1 shows the two-step process of the quality model evaluation.

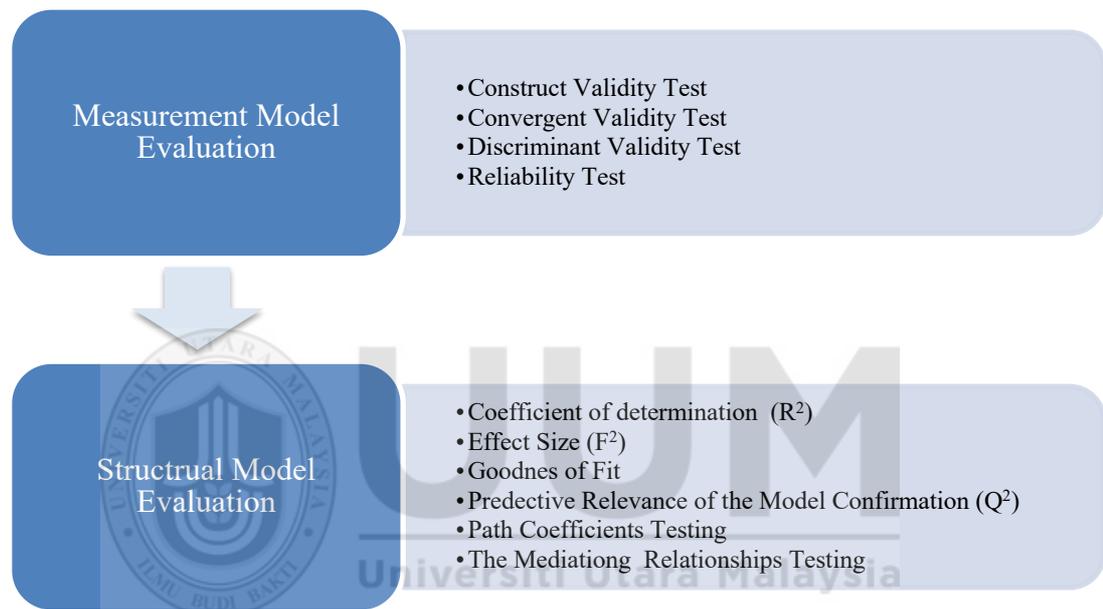


Figure 5.2  
*Two-step Process of PLS-SEM Evaluation*  
 Source: Henseler et al. (2009)

### 5.10.1 Measurement Model

As mentioned previously, the current study employed SEM approach to estimate its theoretical model using PLS-SEM (Hair et al., 2010). This technique is employed throughout the analysis of the main and mediating results for this research. The first step of analysis starts by assessing the measurement model (outer model). The objective of this step is to determine the goodness of measures. Two primary criteria are utilised for this assessment, validity, and reliability (Ramayah, Lee, & In, 2011).

According to Sekaran and Bougie (2010), testing reliability is aimed at determining whether the measuring instrument consistently measures what it supposed to measure, while testing validity is aimed at determining the extent or degree which certain instrument measures a particular concept it is designed to measure. In evaluating the reflective measurement items, the researcher followed the guidelines that Hair, Ringle, and Sarstedt (2011), Henseler et al. (2011), and Henseler et al. (2014) proposed. Figure 5.2 shows the original model of the study.



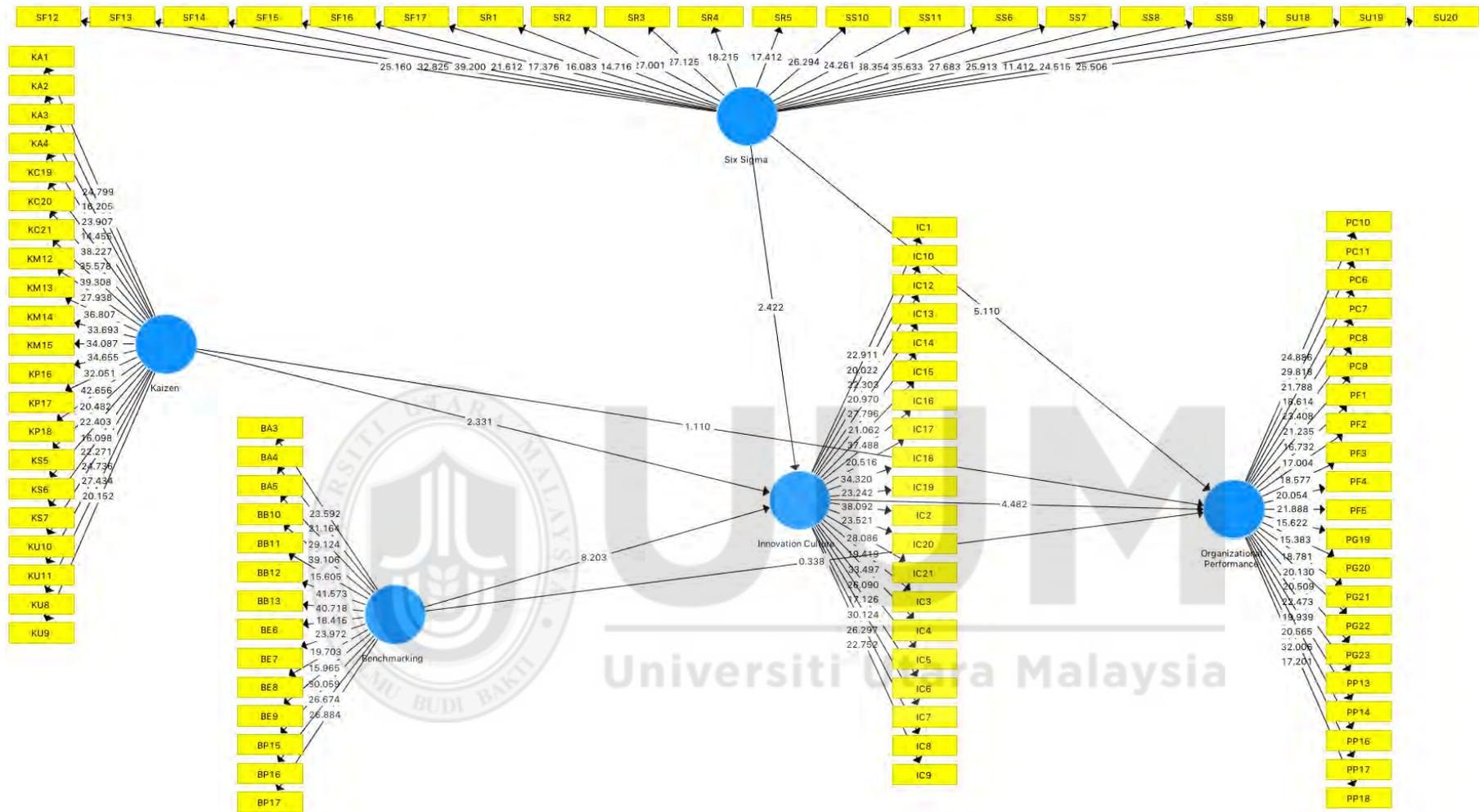


Figure 5.3  
The Original Research Model.

### 5.10.1.1 Construct Validity

To assess whether the instruments used tap the construct as theorised, convergent and discriminant validity could be ascertained by examining the respective loadings and cross-loadings (Ramayah, Lee, & Chyaw, 2011). Hair et al. (2014) suggested the rule of thumb for loadings between 0.40 and 0.70. Indicators with loadings below 0.40 should be removed. This study observed no indicators below 0.40 (see Appendix H); however, there were several indicators between 0.40 and 0.70. Of 103 items, seven items (PP12, PP15, BA1, BA2, BP14, BP18, IC11) were deleted to improve the value of AVEs in keeping with the recommendation by Hair et al. (2014) as well as removing items that were strongly correlated with items of other constructs to decrease the HTMT value as recommended by Henseler et al. (2015). Therefore, 96 items were kept in the entire model as they had loadings values between 0.629 and 0.848 as shown in Table 5.11.

Table 5.11  
*Loadings and Cross Loadings (After Deletion) (Original Model)*

Items	Benchmarking	Innovation Culture	Kaizen	Organizational Performance	Six Sigma
BA3	0.763	0.661	0.451	0.544	0.589
BA4	0.760	0.679	0.483	0.586	0.604
BA5	0.810	0.662	0.490	0.563	0.628
BB10	0.846	0.690	0.505	0.585	0.645
BB11	0.774	0.630	0.476	0.482	0.549
BB12	0.848	0.718	0.552	0.606	0.670
BB13	0.846	0.699	0.533	0.569	0.625
BE6	0.763	0.598	0.498	0.463	0.600
BE7	0.816	0.641	0.527	0.538	0.624
BE8	0.763	0.595	0.551	0.553	0.651
BE9	0.784	0.648	0.569	0.545	0.611

Table 5.11 (continued)

BP15	0.824	0.653	0.504	0.563	0.628
BP16	0.808	0.648	0.485	0.572	0.631
BP17	0.817	0.674	0.531	0.626	0.636
IC1	0.642	0.751	0.481	0.576	0.539
IC10	0.609	0.740	0.482	0.548	0.537
IC12	0.640	0.777	0.494	0.584	0.625
IC13	0.539	0.730	0.456	0.584	0.567
IC14	0.628	0.776	0.475	0.558	0.511
IC15	0.560	0.741	0.432	0.518	0.495
IC16	0.727	0.841	0.529	0.642	0.614
IC17	0.608	0.754	0.507	0.588	0.566
IC18	0.645	0.805	0.545	0.610	0.642
IC19	0.609	0.774	0.508	0.556	0.629
IC2	0.722	0.816	0.540	0.623	0.626
IC20	0.608	0.766	0.502	0.606	0.598
IC21	0.680	0.784	0.546	0.589	0.599
IC3	0.635	0.750	0.425	0.506	0.506
IC4	0.702	0.829	0.531	0.617	0.650
IC5	0.622	0.767	0.528	0.587	0.562
IC6	0.581	0.736	0.567	0.523	0.549
IC7	0.683	0.809	0.497	0.568	0.605
IC8	0.618	0.790	0.569	0.600	0.627
IC9	0.627	0.756	0.587	0.626	0.614
KA1	0.561	0.560	0.748	0.508	0.575
KA2	0.527	0.495	0.629	0.400	0.524
KA3	0.557	0.579	0.751	0.501	0.572
KA4	0.491	0.495	0.639	0.394	0.540
KC19	0.489	0.537	0.828	0.573	0.618
KC20	0.515	0.541	0.827	0.584	0.645
KC21	0.455	0.550	0.829	0.569	0.612
KM12	0.501	0.537	0.815	0.511	0.580
KM13	0.429	0.509	0.815	0.504	0.594
KM14	0.469	0.511	0.820	0.498	0.563
KM15	0.471	0.505	0.837	0.529	0.598
KP16	0.451	0.445	0.823	0.529	0.573

Table 5.11 (continued)

KP17	0.456	0.461	0.814	0.491	0.576
KP18	0.543	0.556	0.842	0.576	0.621
KS5	0.585	0.594	0.724	0.468	0.639
KS6	0.449	0.465	0.757	0.431	0.592
KS7	0.504	0.548	0.657	0.528	0.635
KU10	0.444	0.404	0.750	0.458	0.531
KU11	0.464	0.437	0.759	0.506	0.563
KU8	0.472	0.481	0.786	0.491	0.595
KU9	0.493	0.426	0.748	0.438	0.554
PC10	0.563	0.653	0.505	0.762	0.626
PC11	0.561	0.644	0.500	0.796	0.583
PC6	0.455	0.525	0.421	0.726	0.485
PC7	0.453	0.483	0.448	0.695	0.470
PC8	0.451	0.515	0.476	0.734	0.508
PC9	0.539	0.643	0.455	0.722	0.560
PF1	0.469	0.474	0.417	0.663	0.487
PF2	0.355	0.359	0.415	0.638	0.427
PF3	0.487	0.487	0.503	0.689	0.512
PF4	0.472	0.471	0.453	0.708	0.475
PF5	0.467	0.454	0.414	0.730	0.517
PG19	0.525	0.541	0.477	0.698	0.613
PG20	0.425	0.467	0.468	0.662	0.573
PG21	0.513	0.562	0.459	0.700	0.603
PG22	0.506	0.572	0.463	0.704	0.592
PG23	0.496	0.515	0.520	0.699	0.619
PP13	0.551	0.575	0.475	0.721	0.563
PP14	0.528	0.560	0.433	0.714	0.525
PP16	0.513	0.542	0.417	0.716	0.510
PP17	0.555	0.588	0.530	0.784	0.642
PP18	0.456	0.479	0.447	0.676	0.516
SF12	0.591	0.600	0.590	0.665	0.779
SF13	0.674	0.634	0.615	0.673	0.820
SF14	0.684	0.638	0.594	0.680	0.834
SF15	0.613	0.605	0.579	0.606	0.739
SF16	0.596	0.604	0.501	0.560	0.697

Table 5.11 (continued)

SF17	0.573	0.588	0.606	0.533	0.716
SR1	0.503	0.526	0.496	0.449	0.674
SR2	0.547	0.538	0.593	0.531	0.766
SR3	0.577	0.592	0.596	0.589	0.765
SR4	0.537	0.535	0.583	0.594	0.759
SR5	0.539	0.561	0.580	0.550	0.740
SS10	0.607	0.546	0.537	0.588	0.781
SS11	0.593	0.595	0.542	0.623	0.777
SS6	0.641	0.580	0.589	0.608	0.826
SS7	0.661	0.620	0.619	0.638	0.829
SS8	0.659	0.655	0.605	0.665	0.819
SS9	0.603	0.550	0.555	0.584	0.784
SU18	0.472	0.450	0.632	0.453	0.636
SU19	0.550	0.520	0.596	0.516	0.765
SU20	0.573	0.549	0.639	0.570	0.763

### 5.10.1.2 Convergent Validity

Convergent validity refers to the extent to which the scores of a measured construct correlate with the scores of another construct representing the same concept (Cheah, Sarstedt, Ringle, Ramayah, & Ting, 2018). To verify the convergent validity on the construct level, Hair et al. (2014) suggested using the Average Variance Extracted (AVE). The AVE of each latent variable should be greater than 0.50 for establishing adequate convergent validity (Hair et al., 2011; Hair et al., 2014; Valerie, 2012). Table 5.12 shows that all the values of AVE were within the acceptable range between 0.507 and 0.643 indicating adequate convergent validity.

Composite reliability values (CR) is another criterion to test convergent validity. CR refers to the level to which the construct indicators reveal the latent variable, and they should be higher than 0.70 as recommended by Hair et al. (2011) and Valerie (2012).

In this study, all CR values ranged from 0.956 to 0.969, indicating good convergent validity. Therefore, the entire latent constructs satisfied the threshold value and were considered to have met the standard recommended for convergent validity.

Table 5.12  
*The Convergent Validity Analysis*

Variable	Cronbach's Alpha	Composite Reliability (CR)	AVE
Organizational Performance	0.951	0.956	0.507
Six Sigma	0.962	0.966	0.585
Kaizen	0.966	0.969	0.599
Benchmarking	0.957	0.962	0.643
Innovation Culture	0.965	0.968	0.601

### 5.10.1.3 Discriminant Validity

Establishing discriminant validity is very important to get more confirmation about the construct validity of the outer model. Thus, discriminant validity is a compulsory test before conducting the path analysis.

Discriminant validity measures the degree to which items differentiate among the variables. Mainly, discriminant validity offers that items applied to different constructs do not overlap. Additionally, discriminant validity measures the shared variance between each construct and, thus, it should be higher than the variance shared among distinct constructs (Compeau, Higgins, & Huff, 1999).

A number of measures could be employed to evaluate the discriminant validity of the measurement model such as Fornell-Larcker criterion (Fornell & Larcker, 1981),

cross-loadings of latent variables (Chin, 1998), and Heterotrait-Monotrait (HTMT) ratio (Henseler et al., 2015).

In this study, the HeteroTrait-MonoTrait (HTMT) ratio was applied to assess the discriminant validity in variance-based structural equation modelling. The rationale for applying this new criterion was the insufficient sensitivity of Fornell-Larcker criterion and cross-loadings-based approaches to detect discriminant validity problems (Garson, 2016). Henseler et al. (2015) investigated the effectiveness of HTMT method by testing means of Monte Carlo simulation. They indicated that HTMT was capable of accomplishing higher specificity and sensitivity values (97% to 99%) than Fornell-Larcker criterion (20.82%) and the cross-loadings criterion (0.00%). According to Henseler et al. (2015), the value of HTMT should be less than 1 for determining discriminant validity while Gold, Malhotra and Segars (2001) suggested a value lower than 0.90. Besides, Kline (2010) proposed that the value should be below 0.85. Table 5.13 shows that the HTMT ratio values were within the acceptable level.

Table 5.13  
*Discriminant Validity (HTMT)*

	Benchmarking	Innovation Culture	Kaizen	Organizational Performance	Six Sigma
Benchmarking					
Innovation Culture	0.851				
Kaizen	0.663	0.679			
Organizational Performance	0.723	0.775	0.674		
Six Sigma	0.804	0.779	0.79	0.793	

#### **5.10.1.4 Reliability Analysis**

Composite reliability (CR) was utilised in the current research along with Cronbach's alpha coefficient to test the inter-item consistency of the measurement items. The CR values and Cronbach's alpha should be greater than 0.70 as recommended by Hair et al. (2011) and Valerie (2012). Table 5.12 presents the CR values and Cronbach's alpha of all constructs. It is evident that all exceeded the recommended threshold of 0.70. Hence, construct reliability was confirmed.

#### **5.10.2 Structural Model**

The next stage, after analysing the measurement model was to analyse and assess the structural model. In the PLS procedure for estimating parameters, certain assumptions such as distributional normality of the observations are not followed; hence, traditional parametric-based techniques for testing significance are not appropriate for PLS (Chin, 2010). In place of the traditional parametric-based techniques, statistical significance in PLS analysis is assessed with the help of bootstrap and the jackknife method (Hair et al., 2014). The jackknife method is an algorithm-based technique built into PLS that is used to generate path coefficients for testing significance of hypotheses. One advantage of the jackknife method is that it saves resources and reduces execution time for large data sets (Chin, 2010). Bootstrapping represents a more exact calculation of measures, and this study uses this technique to test the significance of all the path coefficients (Chin, 2010).

As stated earlier, the purpose of bootstrapping in PLS analysis is to evaluate the significance of a model's path coefficients and estimate the standard error (Chin, 1998). In PLS analysis, bootstrapping, which is a non-parametric technique, is used to

randomly generate a large number of subsamples from the original sample with replacement (Efron & Tibshirani, 1993). The bootstrapping is regarded as a superior re-sampling technique that attempts to estimate the sampling distribution of an estimator by re-sampling with replacement from the original sample (Good, 2013). Even though a large number of researchers have recognized the role of bootstrapping, controversy remains about the standard for generating subsamples using the technique. Recent evidence has shown that contemporary researchers often decide the number of bootstrap retrials to undertake based on the peculiarity of their situations (Martins, Oliveira, & Popovic, 2014). However, it has been argued that an inadequate number of retrials may lead to incorrect estimation of standard error, t-values, confidence intervals or conclusions in the test of hypotheses (Bontis et al., 2007). Important guidelines for the selection of the number of re-sampling are still being explored (Andrews & Buchinsky, 2002).

For the present study, the recommendation of Hair et al. (2016) was followed as a total of 5000 retrials were chosen to determine the significance of the model's path coefficients and standard error. In this step of analysis, several assessments should be run as several scholars have recommended (i.e., Chin, 2010; Hair et al., 2014; Hair et al., 2011; Valerie, 2012) including R-square ( $R^2$ ) values, effect size ( $f^2$ ), goodness of fit (GoF), predictive relevance of the model ( $Q^2$ ), path coefficients, and bootstrapping.

#### **5.10.2.1 Coefficient of Determination ( $R^2$ )**

Testing the coefficient of determination ( $R^2$ ) is one of the essential requirements for evaluating the structural model in PLS-SEM (Hair et al., 2011; Hair et al., 2012). The value of  $R^2$  reflects the amount of variance in the dependent variable in question that

can be explained by one or more predictor variables (Hair et al., 2010). According to Hair et al. (2014), there is no rule of thumb for the acceptable level value of  $R^2$  as it depends mainly on the research context and model complexity. Falk and Miler (1992) suggested a value of 0.10 as a minimum acceptable level. Meanwhile, Cohen (1988; 2013) recommended that  $R^2$  of 0.26 means a substantial value, 0.13 moderate value, and 0.02 weak value. While Chin (1998) stated that an  $R^2$  value equal to or higher than 0.67 means substantial, 0.33 moderate, and 0.19 weak. Hair et al. (2014) interpreted the  $R^2$  values of 0.75, 0.50 and 0.25 as being substantial, moderate, and weak respectively.

Table 5.14 and Figure 5.2 show that the  $R^2$  values of the endogenous variables namely innovation culture and organisational performance were 0.716 and 0.661 respectively.

Table 5.14  
*R-Square of The Endogenous Latent Variables*

Constructs	$R^2$	Result
Organizational Performance	0.661	Moderate
Innovation Culture	0.716	Moderate

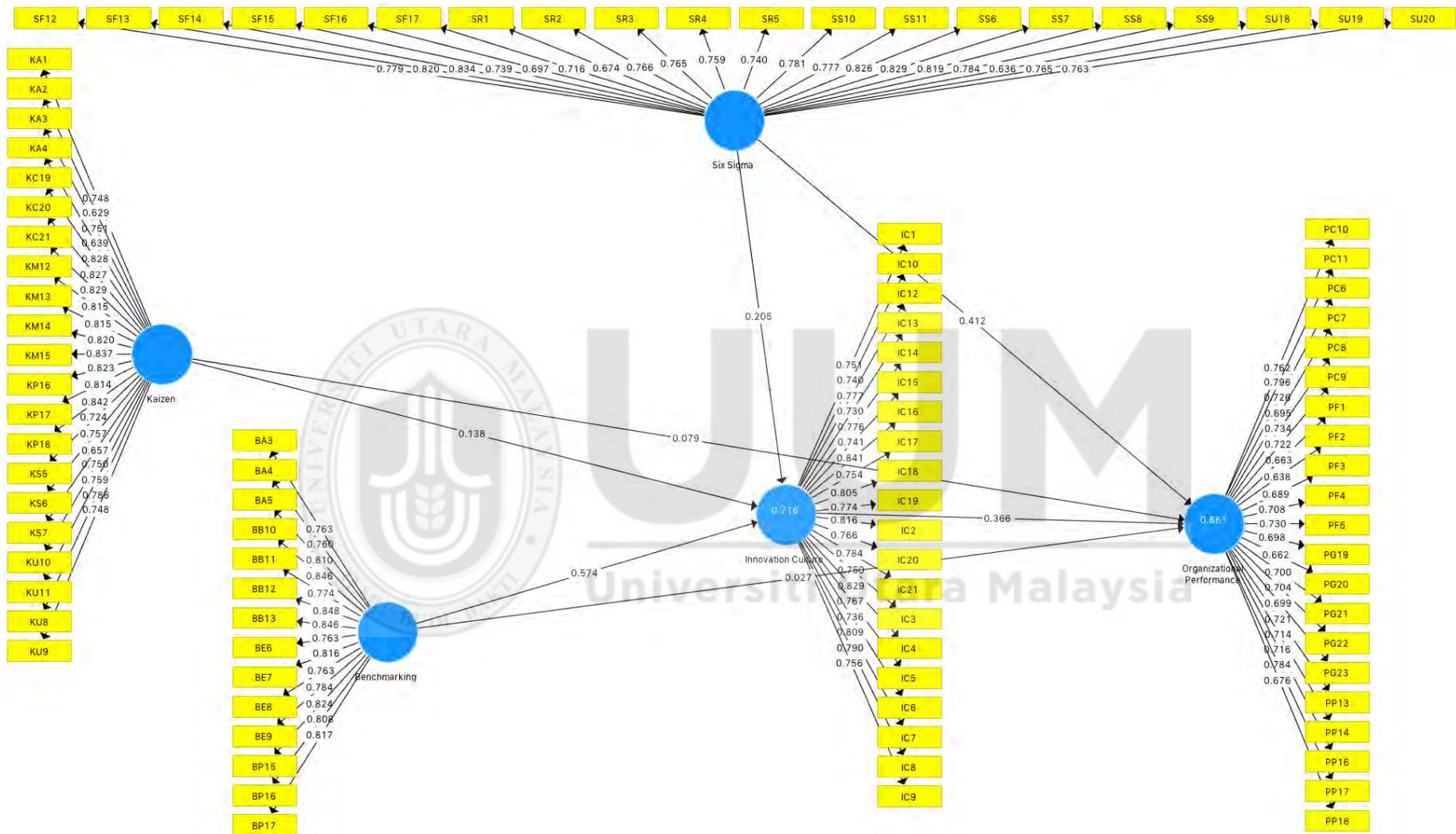


Figure 5.4  
Items Loading, Path coefficient, and R<sup>2</sup>

### 5.10.2.2 Effect Size ( $f^2$ )

Effect Size ( $f^2$ ) is complementary to  $R^2$ . It aims to determine the specific latent variables' impact on the dependent variable (Chin, 2010).  $f^2$  can be calculated using the formula suggested by Cohen (1988) as follows:

$$\text{Effect size } (f^2) = \frac{R_{\text{included}}^2 - R_{\text{excluded}}^2}{1 - R_{\text{included}}^2}$$

Where  $R^2$  included is the  $R^2$  obtained on the endogenous latent variable when the predictor exogenous latent variable is used in the structural model. On the other hand,  $R^2$  excluded is the  $R^2$  obtained on the endogenous latent variable when the predictor exogenous latent variable is not used in the structural model. According to Cohen (1988), the  $f^2$  values of 0.02, 0.15 and 0.35 represent a small, medium and large effect in the structural model respectively.

Table 5.15 indicates that the effect sizes for the Six Sigma, Kaizen, benchmarking, and innovation culture were 0.136, 0.006, -0.094, and 0.106 respectively. Therefore, the effect sizes of all these three exogenous latent variables on organisational performance can be described as having a very small to small effect based on the guideline of Cohen (1988).

Table 5.15  
*The Effect Size of the Organizational Performance and The Interaction Term*

Construct	R <sup>2</sup> incl	R <sup>2</sup> excl	R <sup>2</sup> incl-R <sup>2</sup> excl	1-R <sup>2</sup> incl	Effect Size	Result
Six Sigma	0.661	0.615	0.046	0.339	0.136	Small Effect
Kaizen	0.661	0.659	0.002	0.339	0.006	Very Small Effect
Benchmarking	0.661	0.693	-0.032	0.339	-0.094	Small Effect
Innovation Culture	0.661	0.625	0.036	0.339	0.106	Small Effect

Table 5.16 also shows the effect size values for Six Sigma, Kaizen, and benchmarking as 0.039, 0.028, and 0.449 respectively. The effect sizes of these three exogenous latent on innovation culture can be described as small for Six Sigma and Kaizen and large for benchmarking based on the guideline of Cohen (1988).

Table 5.16  
*The Effect Size of The Innovation Culture and The Interaction Term*

Construct	R <sup>2</sup> incl	R <sup>2</sup> excl	R <sup>2</sup> incl-R <sup>2</sup> excl	1-R <sup>2</sup> incl	Effect Size	Result
Six Sigma	0.717	0.706	0.011	0.283	0.039	Small Effect
Kaizen	0.717	0.709	0.008	0.283	0.028	Small Effect
Benchmarking	0.717	0.590	0.127	0.283	0.449	Large Effect

### 5.10.2.3 Predictive Relevance of the Model (Q<sup>2</sup>)

In addition to assessing the R<sup>2</sup> as a criterion to predict the model's accuracy, the predictive relevance (Q<sup>2</sup>) should be examined as recommended by Hair et al. (2014). The blindfolding procedure is designed to remove a certain amount of the data and consider them as missing values to estimate the model parameters. Then, the estimated parameters are utilised to reconstruct the raw data that are supposed to be missing previously. However, the blindfolding procedure is only applied to endogenous latent variables that have a reflective measurement model specification (Hair et al., 2011,

Hair et al., 2014; Henseler et al., 2009). In this study, therefore, the blindfolding procedure was employed to the endogenous latent variables since all endogenous latent variables were reflective.

Specifically, there are two different measures of predictive relevance ( $Q^2$ ) namely cross-validated redundancy and cross-validated communality (Hair et al., 2014). However, cross-validated redundancy is recommended because it includes both the structural and measurement models for data prediction, which unlike cross-validated communality that includes only the measurement model, which fits the PLS-SEM approach perfectly (Hair et al., 2011; Hair et al., 2014). According to Hair et al. (2011) and Hair et al. (2014), a research model with a cross-validated redundancy value higher than zero is interpreted as having predictive relevance; otherwise, the model's predictive relevance cannot be confirmed. Table 5.17 illustrates that the cross-validated redundancy values of innovation culture and organisational performance were 0.388 and 0.300 respectively. Because all the cross-validated redundancy values of the two endogenous variables of the study were higher than zero, adequate predictive relevance of the study model was ascertained.

Table 5.17  
*Prediction Relevance of the Model*

	SSO	SSE	$Q^2 (=1-SSE/SSO)$
Innovation Culture	4,900.00	2,999.36	0.388
Organizational Performance	5,145.00	3,602.86	0.300

#### 5.10.2.4 Goodness of Fit (GoF) of the Model

PLS-SEM possesses a single measure of GoF, determined by Tenenhaus et al. (2005) as the global fit measure, that is, a geometric mean of the average variance extracted

and the endogenous variables average  $R^2$ . It is calculated with the help of the formula below:

$$\text{GoF} = \sqrt{(R^2 \times AVE)}$$

Therefore, in this study, the GoF of the model was 0.6357, which had been obtained as follows:

$$\text{GoF} = \sqrt{(0.6885 \times 0.5870)} = 0.6357$$

The GoF value of this study was compared with the threshold value proposed by Wetzels et al. (2009) (large = 0.36, medium = 0.25, and small = 0.10). The result indicated that the model's goodness of fit measure was higher than the adequate validity of the global PLS model.

#### **5.10.2.5 Hypotheses Testing**

After the measurement model and structural model were ascertained to be reliable and valid, the next step in PLS-SEM path modelling was to test the hypothesised relationships. To do so, this study utilised the PLS algorithm and the standard bootstrapping procedure with a number of 5000 bootstrap samples and 245 cases to examine the significance of the path coefficients (Hair et al, 2014; Hair et al., 2011; Hair et al, 2012; Henseler et al., 2009). Table 5.18 and Figure 5.5 show the path coefficient values and the bootstrapping results explaining the hypothesised relationships among the study variables.

Table 5.18  
*Result of Direct of Hypothesis Testing*

H	Relationship	$\beta$	T-value	P-values	Supported
H1	Six Sigma -> Organizational Performance	0.412	5.110	0.000	Yes
H2	Kaizen -> Organizational Performance	0.079	1.091	0.275	No
H3	Benchmarking -> Organizational Performance	0.027	0.348	0.728	No
H4	Six Sigma -> Innovation Culture	0.205	2.433	0.015	Yes
H5	Kaizen -> Innovation Culture	0.138	2.362	0.018	Yes
H6	Benchmarking -> Innovation Culture	0.574	8.258	0.000	Yes
H7	Innovation Culture -> Organizational Performance	0.366	4.556	0.000	Yes



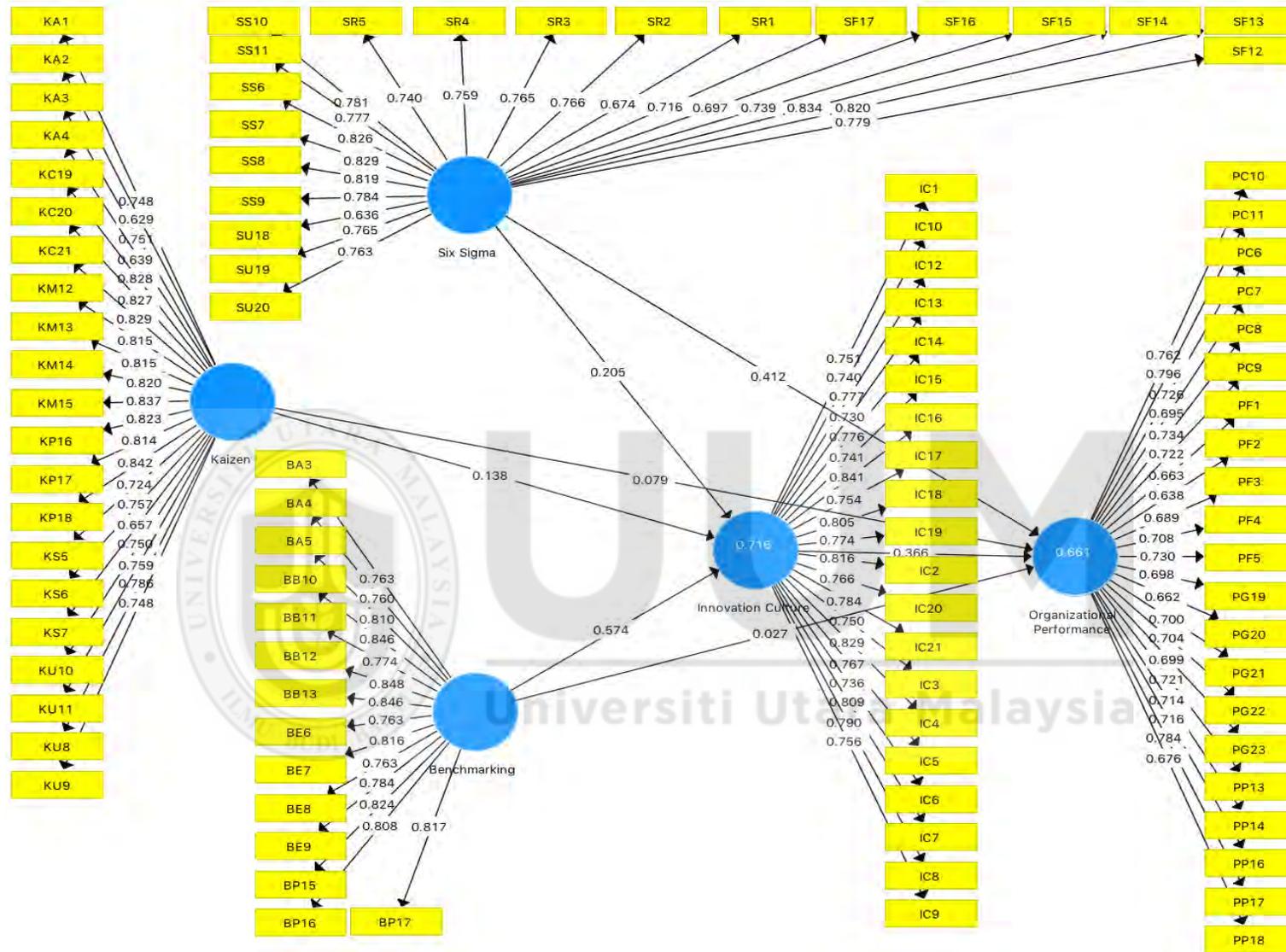


Figure 5.5  
PLS Bootstrapping for the Study Model

### 5.10.2.5.1 Hypotheses Testing of Direct Relationships

The direct hypotheses aim to foresee a direct connection to a latent variable with another. The current research had seven direct hypotheses to be tested coded as H1, H2, H3, H4, H5, H6, and H7. In testing the hypotheses, the path standardized estimate or beta ( $\beta$ ), t-value, standard errors, and probability value were used (Hair et al., 2014). According to Chin (2010), the beta  $\beta$  value of 0.20 is acceptable, but the value above 0.30 is considered meaningful. Cohen (1988) designated the value of beta ( $\beta$ ) of 0.10, 0.30 and 0.50 as being small, medium, and large respectively. Additionally, the coefficient of determination value ( $R^2$ ) was included to ascertain the extent of the variance in endogenous is explained by the exogenous variables.

**a) Hypothesis 1 (H1): Six Sigma has a significant effect on the organizational performance**

The result of the algorithm and bootstrapping PLS-SEM shown in Table 5.18 revealed that the proposed relationship between Six Sigma and organisational performance was positive and highly significant ( $\beta = 0.412$ ,  $t=5.110$ ,  $p<0.001$ ); hence, H1 was supported.

**b) Hypothesis 2 (H2): Kaizen has a significant effect on the organizational performance**

Table 5.18 shows that hypothesis 2 failed to receive empirical support. Kaizen did not show any association with organisational performance ( $\beta = 0.079$ ,  $t = 1.091$ ,  $p>0.05$ ) and therefore the hypothesis was not supported. Hence no conclusion can be drawn (Lane, 2011; Rainey, 2012). Since all the appropriate steps in the methodology that

relate to sampling and measurement error had been taken into account, and data was tested using CMV and *post-hoc* power analysis, the insignificant relationship can be considered not related to the methodological issues.

**c) Hypothesis 3 (H3): Benchmarking has a significant effect on the organizational performance**

No support was found for hypothesis 3 as shown in Table 5.18 because benchmarking was not positively associated with organisational performance ( $\beta = 0.027$ ,  $t = 0.348$ ,  $p > 0.05$ ). Since all the appropriate steps in the methodology that relate to sampling and measurement error had been taken into account, and data was tested using CMV and *post-hoc* power analysis, the insignificant relationship can be considered not related to the methodological issues.

**d) Hypothesis 4 (H4): Six Sigma has a significant effect on the innovation culture**

Table 5.18 reveals that Six Sigma and innovation culture were highly significant ( $\beta = 0.205$ ,  $t = 2.433$ ,  $p < 0.05$ ); hence, hypothesis 4 was supported.

**e) Hypothesis 5 (H5): Kaizen has a significant effect on the innovation culture**

The result showed that Kaizen and innovation culture were significantly associated ( $\beta = 0.138$ ,  $t = 2.362$ ,  $p < 0.05$ ); therefore, hypothesis 5 was supported.

**f) Hypothesis 6 (H6): Benchmarking has a significant effect on the innovation culture**

Since the path coefficient from benchmarking to innovation culture was positive and significant ( $\beta = 0.574$ ,  $t = 8.258$ ,  $p < 0.001$ ), hypothesis 6 received empirical support.

**g) Hypothesis 7 (H7): Innovation Culture has a significant effect on the organizational performance**

The finding revealed that innovation culture had a strong association with organisational performance ( $\beta = 0.366$ ,  $t = 4.556$ ,  $p < 0.001$ ); hence, hypothesis 7 was supported.

#### **5.10.2.5.2 Testing the Mediating Effect of Innovation Culture**

The purpose of the mediation test is to ascertain whether a mediator construct can significantly carry the impact of an exogenous construct to an endogenous construct (Ramayah et al., 2011). In specific terms, the mediation test assesses the indirect impact of the exogenous variable on the endogenous variable through a mediator construct. There are different ways of conducting mediation in multivariate analysis, as Hayes and Preacher (2010) noted. Some of these techniques include: Baron and Kenny's (1986) causal steps approach, the Sobel test (Sobel, 1982), contemporary approaches with fewer unrealistic statistical assumptions and these include re-sampling approach known as PLS bootstrapping (Bollen & Stine, 1990; MacKinnon Lockwood, & Williams, 2004, Preacher & Hayes, 2004) and the distribution of the product method (MacKinnon, et al., 2004).

Significantly, this study employs the PLS structural equation modeling approach to conduct its mediating analysis (Wold, 1985). The PLS-SEM approach is gaining ground among contemporary researchers because of its efficacy and thoroughness (Kim, 2012; Howell & Avolio, 1993) and because it is capable of testing complex

multivariate relationships as in the case of this study. In previous direct relationships, bootstrapping was used to evaluate the statistical significance of relevant path coefficients because it represents a more precise calculation of measures (Chin, 2010). Therefore, the bootstrapping technique is also used to determine the mediation effect in line Preacher and Hayes (2008) and recommended by Zhao et al. (2010), Hayes, Preacher, and Myers (2011), Hayes (2013) and Hair et al. (2014). Specifically, the bootstrapping method with 5000 samples and 95 percent confidence intervals (CI) was utilised in estimating the indirect effects. The outputs of PLS provide the CI values of the indirect effect  $a*b$ , and when a 95 percent CI excludes zero, there is evidence of an indirect effect linking X and Y via mediator with 95 percent confidence, establishing the mediation as shown in Figure 5.6.

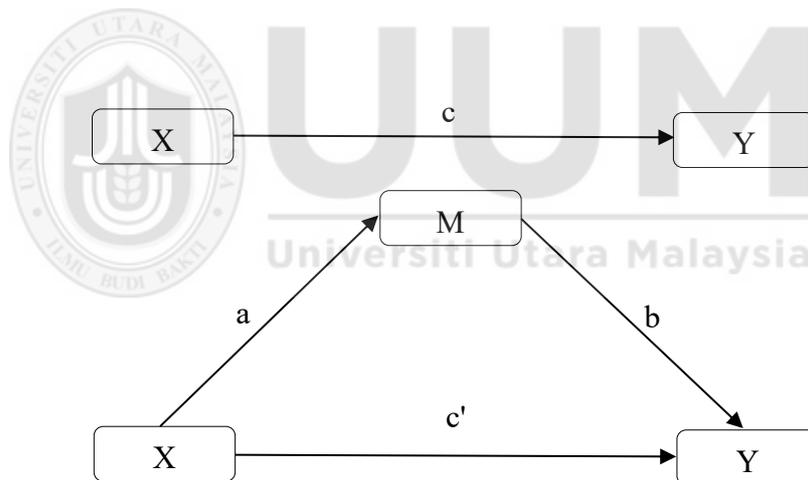


Figure 5.6  
*Simple Mediation Model*  
 Source: Hayes and Preacher (2014)

According to Preacher and Hayes (2008), the effect of the independent variable X on the dependent variable in the absence of the mediator M,  $c'$  path is not a requirement for mediation. The mediation's strength should be tested by the significance of the indirect effect paths  $a*b$  and not by the significant direct effect of path  $c$  (Hayes, 2013; Zhao et al., 2010).

Besides, the criterion proposed by Zhao et al. (2010) was also employed to determine the type of mediation whether the mediation is partial or full. According to Zhao et al. (2010), the indirect effect  $a*b$  must be significant as the necessary condition for mediation, and when the path  $c'$  is not significant, there is a full mediation. However, when the entire path  $a$ ,  $b$ , and  $c$  have similar signs, there is a complementary partial mediation, and when the paths  $a$ ,  $b$ , and  $c$  have different signs, there is a competitive partial mediation. Figure 5.7 shows the criteria for identifying the mediation type.

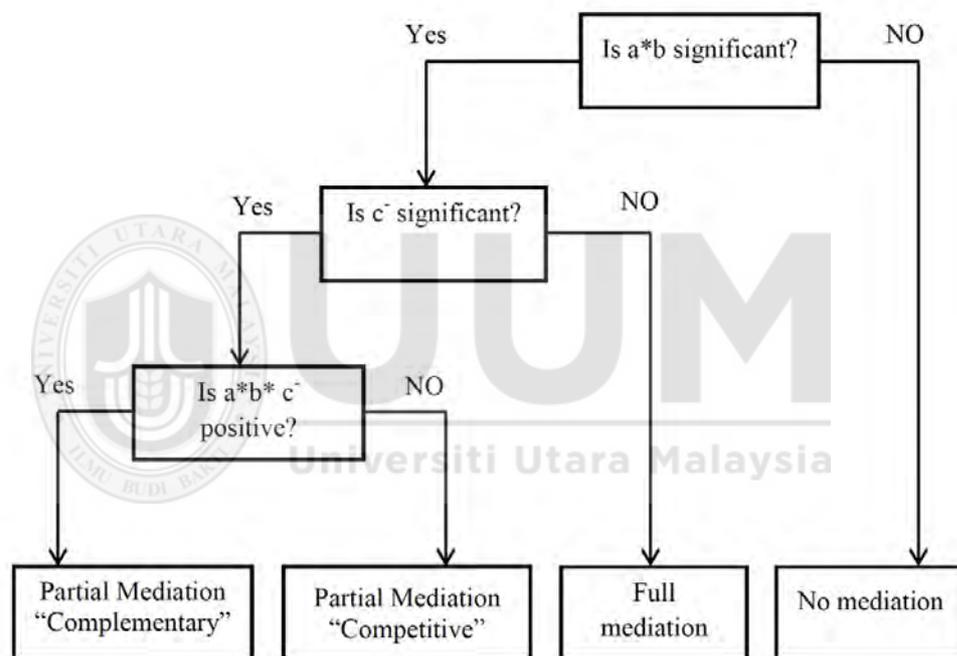


Figure 5.7  
 Criteria of Identifying Mediation Type  
 Source: Zhao et al. (2010)

Based on the study’s model, the mediating effect of innovation culture was proposed as a mediator in the relationship between both Six Sigma, Kaizen, benchmarking, and organisational performance. Specifically, the mediation tests were conducted to find whether innovation culture mediates the relationship between Six Sigma, Kaizen,

benchmarking, and organisational performance. The results of mediation tests are presented in the following sections.

**a) Hypothesis 8 (H8): Innovation culture mediates the relationship between Six Sigma and organizational performance.**

The results of bootstrapping regarding the mediating effect of innovation culture on the link between Six Sigma and organisational performance are presented in Table 5.19. Table 5.20 reveals that the confidence interval of the indirect effects of Six Sigma on organisational performance ( $\beta = 0.075$ , CI = 0.016 to 0.145) did not straddle a zero. The direct path  $c'$  was significant and the signs the paths of  $a$ ,  $b$  and  $c'$  were positive, indicating that innovation culture had a partial mediation (complimentary) effect on the relationship between Six Sigma and organisational performance. Thus, the result revealed that the mediation effect of innovation culture on the relationship between Six Sigma and organisational performance was statistically significant ( $\beta=0.075$ ,  $t=2.283$ ,  $p<0.05$ ). For that reason, Hypothesis 8 was supported.

Table 5.19  
*Result of Indirect Hypothesis Testing*

H	Relationship	$\beta$	t-value	P-value	Supported
H8	Six Sigma -> Innovation Culture -> Organizational Performance	0.075	2.283	0.022	Yes
H9	Kaizen -> Innovation Culture -> Organizational Performance	0.050	2.028	0.043	Yes
H10	Benchmarking -> Innovation Culture -> Organizational Performance	0.210	3.732	0.000	Yes

Table 5.20  
*The Results of Mediating Role of Innovation Culture*

H	Variables	a	b	c'	Point Estimate	Indirect effect		Decision
						95% CI		
						Lower	Upper	
H8	Six Sigma	0.205*	0.366***	0.412***	0.075	0.016	0.145	Partial Mediation (Complementary)
H9	Kaizen	0.138*	0.366***	0.079	0.050	0.009	0.106	Full Mediation
H10	Benchmarking	0.574***	0.366***	0.027	0.210	0.105	0.326	Full Mediation

**b) Hypothesis 9 (H9): Innovation culture mediates the relationship between Kaizen and organizational performance.**

The results of bootstrapping regarding the mediating effect of innovation culture on the relationship between Kaizen and organisational performance are presented in Table 5.20, which shows that the confidence interval ( $\beta = 0.050$ , CI = 0.009 to 0.106) did not include zero, indicating that innovation culture significantly mediated the relationship between Kaizen and organisational performance. The direct effect c' of Kaizen was not significant, indicating that innovation culture was a full mediator between Kaizen and organisational performance. Therefore, the result demonstrated that the mediation effect of innovation on the relationship between Kaizen and organisational performance was significant ( $\beta=0.050$ ,  $t=2.028$ ,  $p<0.05$ ). Consequently, the result supported H9.

**c) Hypothesis 10 (H10): Innovation culture mediates the relationship between benchmarking and organizational performance.**

Table 5.20 shows that the confidence interval of the indirect effect of benchmarking on the organisational performance ( $\beta=0.210$ , CI=0.105 to 0.326) did not include zero.

The direct effect c' of benchmarking was not significant, indicating that innovation culture was a full mediator between benchmarking and organisational performance. Hence, the result revealed a significant mediating effect of innovation culture on the relationship between benchmarking and organisational performance ( $\beta=0.210$ ,  $t=3.732$ ,  $p<0.001$ ). Thus, Hypothesis 10 was supported.

In conclusion, this study used the bootstrapping method with a minimum of 5000 bootstrap samples and 95 per cent confidence interval values in testing the mediating role of an innovation culture in the link between Six Sigma, Kaizen, benchmarking, and organisational performance. The results found that innovation culture was a significant mediator on all hypothesised relationships.

### 5.10.2.5.3 Summary of the Findings

Table 5.21 shows a summary of the results related to all hypotheses tested.

Table 5.21  
*Summary of the Results*

H	Hypothesis Description	Results
<b>Results of Direct Relationship</b>		
H1	Six Sigma has a significant effect on the organizational performance	Support
H2	Kaizen has a significant effect on the organizational performance	Not Supported
H3	Benchmarking has a significant effect on the organizational performance	Not Supported
H4	Six Sigma has a significant effect on the innovation culture	Support
H5	Kaizen has a significant effect on the innovation culture	Support

Table 5.21 (continued)

H6	Benchmarking has a significant effect on the innovation culture	Support
H7	Innovation Culture has a significant effect on the organizational performance	Support
<b>Results of Indirect Effect Via Innovation Culture</b>		
H8	Innovation culture mediates the relationship between Six Sigma and organizational performance	Support
H9	Innovation culture mediates the relationship between Kaizen and organizational performance	Support
H10	Innovation culture mediates the relationship between benchmarking and organizational performance	Support

### 5.11 Summary

In this chapter, the results of the study were presented. In the beginning, the survey response, data screening, and preliminary analysis were established using SPSS. Then, the results of the assessment of the measurement and structural models and the testing of the direct hypotheses and mediation were obtained using PLS path modelling. Further, CMV and a *post-hoc* power analysis was employed to determine the significance of the study result. Finally, the summary of findings was presented which showed that some of the hypotheses were supported while some were not. More specifically, five out of seven direct hypotheses were observed to be significant while two hypotheses were not. Furthermore, all three mediating relationships hypotheses were supported.

## **CHAPTER SIX**

### **DISCUSSION AND CONCLUSION**

#### **6.1 Introduction**

The present chapter discusses the findings presented in the previous chapter. It begins by recapitulating the study and followed by a discussion on the results by linking them to theory and past research. Next, the contributions of the study to the existing literature as well as practice are presented. This chapter also outlines the limitation of the study and the potential direction for future research. Finally, a conclusion is drawn that summarises the whole chapter.

#### **6.2 Recapitulations of the Study**

Public sector organisations including governments confront a growing pressure to provide quality services for the public (Arnaboldi et al., 2015; Moran, 2016). Thus, it is necessary to improve these services and reach the performance level attained by private organisations (Van Dooren et al., 2015). Service quality in government organisations and police agencies, in particular, is a central concern in any country (Allen & Sawhney, 2015) because such services affect the quality of life of the communities (Doss et al., 2017). Police agencies seek to implement the rule of law and enhance public safety and security (Brantingham et al., 2017; Legrand & Bronitt, 2012). In achieving these tasks and tackle these problems, researchers and public managers have advocated the adoption of a range of management strategies and tools that could contribute to improving the quality of the provided services (Brantingham et al., 2017; Legrand & Bronitt, 2012).

Continuous improvement tools can assist police agencies in improving organisational performance and meeting the requirements of a local community (Antony et al., 2017bc; Barton, 2013a; Barton & Matthews, 2015; Barton & Matthews, 2017). The literature on continuous improvement tools shows a wide implementation of the tools in private sector organisations. However, public organisations seem not to employ the tools that much (Chiarini, 2013; Delias & Delias, 2017; Kuvvetli & Firuzan, 2017; Suarez-Barraza & Miguel-Davila, 2014) particularly in policing (Antony et al., 2017bc; Barton, 2013a; Barton & Matthews, 2015; Barton & Matthews, 2017). Therefore, this study was motivated by the fact that continuous improvement tools (Six Sigma, Kaizen, and benchmarking) could enhance organisational performance in public sector organisations.

A comprehensive review of the literature revealed an extensive research work regarding the separate effect of these tools on innovation culture and organisational performance in the private sector; however, such impact seemed to be greatly neglected in the public sector. Therefore, this main objective of this study was to investigate the role of these continuous improvement tools in organisational performance. It also examined the mediating effect of innovation culture on the relationship between Six Sigma, Kaizen, and benchmarking on organisational performance in the Dubai Police. The Dubai Police was chosen not only because of its contribution to the security and economy of Dubai but also because they face many challenges to improve their performance. The study was grounded by systems theory and resource-based view (RBV) theory. Based on the research problem and a comprehensive review of the relevant literature, this study aimed to achieve the following objectives: (a) to examine the effect of Six Sigma on organisational performance of the Dubai Police; (2) to investigate the effect of Kaizen on

organisational performance of the Dubai Police; (3) to assess the effect of benchmarking on organisational performance of the Dubai Police; (4) to examine the effect of Six Sigma on innovation culture of the Dubai Police; (5) to investigate the effect of Kaizen on innovation culture of the Dubai Police; (6) to assess the effect of benchmarking on innovation culture of the Dubai Police; (7) to examine the effect of innovation culture on organisational performance of the Dubai Police; (8) to investigate the mediating role of innovation culture on the relationship between Six Sigma and organisational performance of the Dubai Police; (9) to assess the mediating role of innovation culture in the relationship between Kaizen and organisational performance of the Dubai Police; and (10) to explore the mediating role of innovation culture in the relationship between benchmarking and organisational performance of the Dubai Police.

To achieve the objectives above, a comprehensive literature review was conducted. Previous literature revealed a wide use of Six Sigma, Kaizen, and benchmarking in private organisations but not in public organisations, specifically police organisations. The majority of past studies reported a positive effect of Six Sigma, Kaizen, and benchmarking on organisational performance.

Based on the literature, variables were extracted to formulate the framework of this study. The framework was tested using quantitative methodology. A survey was conducted, and data were collected by using a questionnaire. The questions were adopted and adapted from previous instruments for face and content validity. A five-point Likert scale was used to measure all items. To ensure the validity and reliability of the instruments used, a pilot study was conducted involving 62 participants. The results indicated a satisfactory level of goodness of measure, and therefore the final

questionnaire was used to collect the data. The questionnaire was distributed to 338 head sections in the Dubai Police departments through drop-off and online methods. A proportionate stratified random sampling technique was employed. The study used Smart PLS and SPSS for data analysis. This research applied a significance level of 0.05 to reject or accept the research hypotheses.

### **6.3 Discussions**

As mentioned earlier, ten hypotheses were tested. Eight were supported, and two were not (H2 and H3). Hypothesis two (H2) predicted a significant relationship between Kaizen and organisational performance and hypothesis three (H3) predicted a significant relationship between benchmarking and organisational performance. However, the results showed that these hypotheses were not statistically significant ( $p > 0.05$ ) and therefore were not supported. The reason for these insignificant results was discussed in the previous chapter. This discussion and conclusion section will only discuss the hypotheses that were found to be significant.

#### **6.3.1 Six Sigma and Organizational Performance**

Six Sigma was found to have a significant and positive impact on the organisational performance of the Dubai Police. This result is consistent with that of past studies (Ahmed et al., 2018; Ali et al., 2016; Gunawan & Karimah, 2017; Hilton et al., 2008; Hwang et al., 2017; Jacobs et al., 2015; Mishra & Sharma, 2017; Mustafa & Jamaluddin, 2017; Nayeri & Rostami, 2016; Patyal & Koilakuntla, 2017; Shah et al., 2008; Sin et al., 2015; Singh et al., 2017; Swink & Jacobs, 2012; Uluskan et al., 2017; Zu et al., 2008). The result suggested that Six Sigma is critical for the Dubai Police to achieve its goals and attain the planned performance. Effective and efficient

implementation of Six Sigma in the Dubai Police could reduce the variations in the processes and customer complaints, increase their satisfaction, and improve the performance (Abreu et al., 2012; Al-Aomar & Chaudhry, 2018; Al Khamisi et al., 2018; Braunscheidel et al., 2011; Raja et al., 2018). To this end, it could be argued that the level of Six Sigma practices in the Dubai Police was adequate to foster organisational performance. Besides, the awareness of managers towards Six Sigma was notably seen that led to the achievement of better performance and sustainable competitive advantage.

### **6.3.2 Six Sigma and Innovation Culture**

It was found that the Six Sigma had a positive and significant impact on innovation culture. The result of this research is consistent with previous investigations which revealed that Six Sigma has a positive and significant impact on innovation (Yusr, Othman, & Mokhtar, 2012). It was also found to play a role in reinforcing innovation culture and building a reliable work environment (Eriksson & Garvare, 2005), creating systematic innovation in an organised way (Eng, 2011), shortening the innovation process (Sony & Naik, 2012), and stimulating and achieving breakthrough in innovations (Antony et al., 2016b; Byrne et al., 2007). Davison and Al-Shaghana (2007) also demonstrated that Six Sigma organisations scored a higher level of quality culture than organisations that did not have such a culture. Byrne et al. (2007) found that adopting Six Sigma contributed to achieving breakthrough innovations and changing the culture towards one that supported continual innovation.

In a nutshell, Six Sigma seeks to develop employee capacity and promote their commitment toward continuous improvement (Flynn, Schroeder, & Sakakibara, 1995). It emphasises the human and organisational aspects of quality and employs

several techniques and tools to ease making changes, such as encouraging teamwork, using communications effectively to increase awareness of organisational objectives and allowing the employees to participate in the decision-making process (Kaynak, 2003). Six Sigma can also help reinforce the innovation performance of an organisation (Yusr et al., 2012) by providing many types of resources, whether intangible or tangible, to support innovation and competitive advantage (Flynn et al., 1995; Pesic, 2007). In summary, the result revealed that Six Sigma initiatives at the Dubai Police had a substantial impact on employees in improving their work behaviour and generating innovative ideas. As a result, a culture based on innovation was established.

### **6.3.3 Kaizen and Innovation Culture**

The result showed that Kaizen had a positive and significant impact on innovation culture. This finding is in line with several studies that reported a similar result (McAdam et al., 2000; Satsomboon & Pruetipibultham, 2014; Suarez-Barraza & Ramis-Pujol, 2010; Suarez-et al., 2012). Kaizen could also enhance continuous innovation (Boer & Gertsen, 2003) and reinforce a culture through its activities that improve the behaviour of the teams (Anand et al., 2009; Brunet & New, 2003). Thus, repetition and sustenance of this behaviour contribute to strengthening a Kaizen culture across the organisation (Anand et al., 2009; Brunet & New, 2003; Mishra & Gupta, 2010; Pakdil & Leonard, 2015).

The result revealed that Kaizen activities in the Dubai Police could reinforce innovation traits of the employees, resulting in the development of a culture that promotes innovation. As a result, organisational performance was improved.

Employees had innovation awareness to fight crimes and provide safety and security to society.

#### **6.3.4 Benchmarking and Innovation Culture**

The finding revealed that benchmarking had a positive and significant relationship with the innovation culture. The finding is consistent with past studies (Gierczak-Korzeniowska & Gołembski, 2017; Hodgson et al., 2007). Benchmarking has also a role in encouraging innovation (Norek, 2012; Radnor & Robinson, 2000; Tellis et al., 2009) and promoting a learning culture across the organisation (Al-Majali, 2017; Moraru & Grecu, 2015; Mungai, 2016), resulting in improved performance and competitive advantage (Alosani et al., 2016; Attiany, 2014; Moraru & Grecu, 2015).

Clemente and Balmaseda (2010) pointed out that benchmarking is a technique of management innovation. It plays a major role in identifying the best practices, structures and procedures with respect to innovation (Radnor & Robinson, 2000). Knowledge collected and developed within the organisation and gained from the market facilitates the creation and implementation of innovation and hence the development of an innovation culture (Gierczak-Korzeniowska & Gołembski, 2017).

In summary, the Dubai Police were on the right track in promoting the innovation culture by improving the skills of the employees. Benchmarking helped the Dubai Police to implement the best practice and sustain a productive work environment that could reinforce innovation culture and, hence, improve entire organisational performance.

### **6.3.5 Innovation Culture and Organizational Performance**

The study demonstrated that innovation culture had a positive and significant impact on organisational performance ( $\beta= 0.366$ ,  $t=4.556$ ,  $p<0.001$ ). The result parallels past investigations (Anderson et al., 2012; De Brentani, 2001; De Brentani & Kleinschmidt, 2004; Kuo & Tsai, 2017; Lee et al., 2017a; Rosenbusch et al., 2011; Salim & Sulaiman, 2011; Stock et al., 2013; Wei et al., 2012; Zhang & Huang, 2010). The result suggests that innovation culture is an important driver of organisational performance as it can support the organisation's innovative actions that lead to improved performance and competitive advantage. An innovation culture has a powerful impact on an organisation and its competitiveness position (Barney, 1986, Gürlek & Tuna, 2018; Hall, 1993; Wernerfelt, 1984). It is one of the main factors that influence the organisation's success by shaping values, beliefs and commitment of employees to confront rivals and achieve the organisational objectives (Kuratko & Welsch, 2004).

The innovation culture was realised by the Dubai Police officers as the most important factor that led to the achievement of a high level of performance. Such a culture could enhance the organisational capabilities and exploit available resources to achieve success. It encouraged employees to create ideas and enhance innovation, improving the current services and developing new innovative channels of service that satisfied the customers and relevant stakeholders. Ultimately, the entire organisational performance was enhanced. Therefore, it can be said that establishing an innovation culture is precedence for any organisation to achieve high performance and attain competitive advantage.

### **6.3.6 The Mediating role of Innovation Culture between Six Sigma and Organizational Performance**

The result indicated that innovation culture positively mediated the relationship between Six Sigma and organisational performance. Specifically, innovation culture was found to mediate (complementary) between the two constructs partially. The result suggested the logical use of innovation culture in assisting organisations in achieving performance through Six Sigma (Erwin & Douglas, 2000; Hult et al., 2004). In other words, innovation culture in this study played a role as a mechanism that explained the impact of Six Sigma on organisational performance.

In the context of this study, when managers in the Dubai Police utilised Six Sigma initiative to improve organisational performance of their departments, they also intensified the innovation culture. This because the effect on performance was not directly due to Six Sigma alone, but also indirectly due to the innovation culture.

Previously, some investigations found a positive correlation between Six Sigma and organisational performance and other studies demonstrated a positive link between innovation culture and organisational performance. The present study demonstrated a joint effect of Six Sigma and innovation culture on organisational performance. The finding helps to fill the gap in the literature with regard to the effect and role of innovation culture as a mediator in the relationship between Six Sigma and organisational performance. This is because of a lack of studies that investigated Six Sigma and innovation culture as an approach for improving organisational performance and attaining competitive advantages (Azis & Osada, 2010; Shafer & Moeller, 2012; Sony & Naik, 2012).

### **6.3.7 The Mediating Role of Innovation Culture between Kaizen and Organizational Performance**

The result showed that innovation culture fully mediated the link between Kaizen and organisational performance. The logical effect of innovation culture as a mechanism to explain the relationship between Kaizen and organisational performance was observed. However, the direct relationship between Kaizen and organisational was not significant. This is to say that innovation culture mediated the relationship between Kaizen and organisational performance, which is consistent with previous studies which found that Kaizen was heavily dependent on culture to get success (Garcia, 2015; Oki, 2012; Pakdil & Leonard, 2015).

The finding indicated that the direct effect of Kaizen did not enhance the organisational performance of the Dubai Police; however, when innovation culture was added as a mediator, the indirect relationship between Kaizen and performance existed. This finding showed that the managers of the Dubai Police that practised Kaizen activities influenced the performance of their department indirectly by invoking innovation culture.

The finding of this research helps to fill the gap in the literature with regard to the role of innovation culture as a mediator in the relationship between Kaizen and organisational performance, specifically in the Dubai Police context. It is quite logical that innovation culture is required for the implementation of Kaizen activities in the Dubai Police. The Kaizen activities can be effectively implemented in a culture that facilitates employees to innovate and improve by providing a proper environment for employees. Hence, employees can implement Kaizen effectively, which in turn reflects positively on the performance of the organisation.

### **6.3.8 The Mediating role of Innovation Culture between Benchmarking and Organizational Performance**

The result demonstrated that innovation culture influenced the benchmarking of the Dubai Police to increase organisational performance. This result is consistent with numerous studies that found that successful benchmarking implementation required a culture to get success (Abazeed, 2017; Hanson & Voss, 1995; Hashim et al., 2012a). Benchmarking can promote the evolution of a learning culture across the organisation (Al-Majali, 2017; Moraru & Grecu, 2015; Mungai, 2016), which would lead to improved performance and competitive advantage (Alosani et al., 2016; Attiany, 2014; Moraru & Grecu, 2015).

The finding suggests that for benchmarking to have a positive impact on the organisational culture at the Dubai Police, an innovation culture was imperative. Benchmarking provides a suitable environment for employees to implement activities of benchmarking properly. Benchmarking activities can also assist the Dubai Police to improve the services continuously and effectively by providing knowledge about the best practices in the field, disseminating this knowledge among staff, and taking appropriate actions.

The present mediation result supports the RBV theory in innovation culture is an important resource of an organisation for improved performance and competitive advantage (Barney, 1991). Hence, it can be concluded that innovation culture and benchmarking can be deployed together to enhance the overall performance of the Dubai Police. Furthermore, the result bridged the gap in the literature about the effect and role of innovation culture as a mediator in the relationship between benchmarking and organisational performance, specifically in the Dubai Police context.

## **6.4 Contributions of the Study**

The findings of this research have important implications for theory, methodology, and practice. The following details the implications of the study.

### **6.4.1 Theoretical Contributions**

The theoretical contribution of this study comes from the model explaining the relationship between Six Sigma, Kaizen, benchmarking and organisational performance and the mediating effect of innovation culture on the mentioned relationship. Six Sigma, Kaizen, benchmarking are important continuous improvement tools that can be used to improve performance. The combination of these tools with innovation culture into a single model that influences organisational performance has received little attention in the past. This study is the pioneering study that examined these factors in the government sector. Thus, it contributes to the body of knowledge by responding to the need for empirical investigation on the association between such continuous improvement tools and organisational performance which is characterised as being complex and unstable especially in the public sector (Antony et al., 2016a; Antony et al., 2017ab; Bhatia & Drew, 2006; Delias & Delias, 2017; Pedersen & Huniche, 2011; Suarez-Barraza & Miguel-Davila, 2014).

The analysis of the relationship between continuous improvement tools (Six Sigma, Kaizen, and benchmarking) and organisational performance enhances the literature on channel relationships. This study demonstrated the importance of such tools in public departments and police agencies in particular. It contributes theoretically to the literature of continuous improvement by re-examining the association between continuous improvement tools and performance. The inconsistency among researchers

in the past regarding the impact of continuous improvement tools on performance called for further discussion and investigation. Moreover, this research contributes significantly to the literature by integrating effective innovation culture as a mechanism to the theoretical model to better explain the variance in the construct of organisational performance.

Regarding service organisations and particularly police agencies, this research contributes to the literature by responding to the call for more research works on the association between continuous improvement tools and organisational performance as the link is still not established. Thus, this research adds to narrow the gap in the literature related to this relationship. The study showed the significant effect of continuous improvement tools and innovation culture on organisational performance. Moreover, this study revealed that the organisational performance of police agencies could be improved by incorporating these variables, and their significant role as a composite construct supports and contributes to systems theory and the RBV theory.

Examining the continuous improvement tools (Six Sigma, Kaizen, and benchmarking) and innovation culture as aggregated variables and their impact on organisational performance narrows the gap in the literature. The study also reveals that continuous improvement tools with innovation culture should be implemented as a holistic strategy rather than separate practices or activities as the findings suggest.

The literature indicated that the majority of past studies concentrated on the manufacturing sector. However, this study extended the existing literature in the public sector, taking the Dubai Police departments in UAE as a case. Most studies in the public sector and police departments, in particular, were very limited. Some were

descriptive, observational, and conceptual. Therefore, this study on the Dubai Police in UAE was an attempt to add to the existing literature. Moreover, this research is one of the scarce investigations carried out in the developing countries especially in the Arab countries and in the context of policing since most studies were conducted in developed countries.

Also, very few studies have been conducted in the context of developing countries. By the development of this more encompassing and robust model, an important contribution to the body of knowledge has also been made. This model can be used to make further predictions, especially with some of its results that are significant/consistent with previous studies. However, other results of this study that are insignificant and inconsistent with previous studies create or open rooms for further studies.

This study was underpinned by systems theory and RBV theory. The relevance of system theory and continuous improvement is that organisations should operate in an open system so that they can relate to the variables within the environment. On the other hand, the RBV theory was relevant to continuous improvement because organisations should constantly conform and align themselves to the changing environment. The finding provides support for the RBV theory, which postulates that organisations with a set of resources can strengthen unique capabilities and obtain sustained competitive advantage and superior performance. Innovation culture as a dynamic capability supports the sustainability of an organisation by providing inclusive infrastructure that enable the organisation to organise its resources for improvement projects and achieving sustainable outcomes (Anand et al. 2009; Bessant

& Francis 1999; Bessant, Caffyn, & Gallagher, 2001; Oxtoby et al., 2002; Teece & Pisano, 1994).

#### **6.4.2 Methodological Contribution**

This research also contributes to the methodological viewpoint by validating the established measurements in a different context, i.e., in the policing context, when the measures were previously employed in the manufacturing industry. Consequently, repeating the measurement in another context is necessary to confirm their reliability and validity. The Cronbach's alpha and composite reliability were examined in this study and found to be above the minimum yardstick.

#### **6.4.3 Practical Contributions**

The findings have significant implications for managers, practitioners, and policymakers about the importance of using continuous improvement tools in an innovation culture to affect organisational performance positively. That is, the findings of this research can increase the awareness of the decision makers and managers in the Dubai Police on the significance of implementing continuous improvement tools in their departments. Such tools as an improvement philosophy are considered a prerequisite for any organisation that wants to achieve competitive advantages and increase organisational performance. In other words, if the Dubai Police wants to implement improvement strategies, Six Sigma, Kaizen, and benchmarking are needed because of their observed impact organisational performance.

The findings also reported that culture has a crucial role in the organisation the successful implementation of continuous improvement tools. The results suggest that managers in the Dubai Police develop and enhance an innovation culture and increase

the awareness of employees about the importance of continuous improvement tools to improve organisational performance. The finding also suggests that continuous improvement tools (Six Sigma, Kaizen, and benchmarking) should be effectively incorporated in the Dubai Police. The policymakers of the Dubai Police should pay attention to reinforcing the innovation culture to be aligned with the daily activities and continuous improvement tools. The integration of these practices in the Dubai Police is critical to increase the performance and achieve the optimum competitive advantages. Managers usually tend to focus more on Six Sigma, Kaizen, and benchmarking tools as they have a direct effect on organisational performance and ignore culture. Although the results of the effect of Kaizen and benchmarking on organisational performance were insignificant, innovation culture as a mediator led to enhancing this relationship. This result suggests a lack of awareness among the Dubai Police officers of the importance of Kaizen and benchmarking in enhancing organisational performance. Therefore, there is a need to increase this awareness about the culture's essential role which managers should take into consideration when implementing any practices in the future.

The managers of the Dubai Police should allocate the necessary resources such as training programs and allocate a certain budget for educating and training employees. The findings revealed a shortage of training programmes for employees which led to a lack of understanding of Kaizen and benchmarking and their role in improvement. The policymakers can also include principles of continuous improvement and quality in the curricula so that the Dubai Police employees could understand the principles of continuous improvement and their role in improving organisational performance and attain competitive advantage

Finally, this study can also give insights for service, public, manufacturing and public organisations as well as police agencies in the UAE and around the world. For example, other police departments in other emirates in the UAE can take this research as a guideline when striving for improvement. Specifically, police departments whether in the UAE or outside the UAE understand that Six Sigma, Kaizen, benchmarking, and innovation culture are necessary nowadays if they wish to be successful and attain competitive advantages. In some police departments, continuous improvement tools are being implemented but without an appropriate culture. Therefore, the integration of these strategies and techniques will assist the police departments in improving their performance. Other companies can also benefit from the findings of this study.

## **6.5 Limitations of the Study**

Despite the insights offered, this study suffers from a number of limitations that should be considered when interpreting the results of the study.

Firstly, the scope of the present research was restricted to the Dubai Police officers only and did not include other police departments in the UAE or authorities of the UAE or Dubai Government. This limitation affects the generalisability in that the findings may not be generalizable to other public organisations and even other private companies.

Secondly, a cross-sectional approach used is another limitation of the study. The psychological changes in people in the Dubai Police could not be accounted for from the use of a cross-sectional study. In this regard, the conclusion drawn from this research might be different if a longitudinal approach was used instead. Because Six

Sigma, Kaizen, and benchmarking are long-term strategies, investigating their effect on organisational performance at any one point of time would lead to inaccuracy. Hence, future research may wish to consider the longitudinal approach instead.

Thirdly, since this study was quantitative in nature, answers given by the respondents could have been biased. However, as the validity and the reliability of the subjective instruments were established and common method variance and power analysis were found to be of not a threat, such biased answers were not an issue. But, if researchers wish to get an in-depth understanding of the processes and mechanisms involved at the same time, they should consider using mixed research design in which quantitative and qualitative.

The fourth limitation was the shortage of empirical and conceptual investigations that looked at the implementation of continuous improvement tools (Six Sigma, Kaizen, and benchmarking) in the policing context. This was also observed empirically while conducting the survey where Six Sigma, Kaizen, and benchmarking were considered new concepts for the service sector in the UAE and still not widely spread as other quality improvement tools. This means that efforts should be taken to introduce the principles of continuous improvement and investigate their implementation in the police context in order to employ them as a database for future studies in the field of continuous improvement and quality management.

Finally, another important limitation of the present study was the lack of other studies tackling the same factors in the UAE. As a result, comparison of the present results with other studies in the same context could not be made. That is because there was no

similar research in the UAE previously, the researcher had to proceed with the study without having the advantages of benchmarking with past studies.

## **6.6 Recommendations for Future Research**

Policymakers and top management of the Dubai Police need to prioritise their continuous improvement strategies, especially at the level of employees since they are the dynamic resource for the development and implementation of the strategies in the organisation. It was clear from the survey that employees were interested in using and implementing continuous improvement tools to eliminate wastes and reduce errors at the workplace. However, the lack of engagement and weak empowerment of employees made them less committed to the improvement and innovation process, which negatively affected their innovation skills, resulting in the failed implementation. Therefore, the continuous improvement strategies and the development of an innovation culture at both organisational and individual levels should be strengthened and supported.

At the organisational level, the top management in the Dubai Police has to remove barriers to efficiency and provide an innovation culture and continuous improvement. This starts with improving the innovation skills of employees by extending the focus on the individual level. Employees need to be continuously educated about the recent strategies, technologies and procedures in the police departments, and they should be encouraged to involve themselves voluntarily in task forces and committees. Hence, employees should be trained to use continuous improvement tools that allow them to analyse, monitor and evaluate the overall performance accurately. Also, employees are encouraged to be involved in research and development (R&D) programmes through their participation in surveys and publications. This is essential to consolidate the

principles of continuous improvement tools more practically, which can significantly enhance their innovation skills.

The cross-sectional approach was used to collect the data at a point of time. Because of the complicated joint impact of continuous improvement tools (Six Sigma, Kaizen, and benchmarking) on innovation culture and organisational performance, longitudinal research could be employed to clarify and explain the complicated relationships over a long period. This approach can detect the changes in the association among the variables through over time. Another limitation of the study concerns the research design, which restricted the researcher to detect the dynamic associations between the variables over time. Consequently, to be able to assess the dynamic impact of Six Sigma, Kaizen, and benchmarking on organisational performance, a case study approach could be considered a possible option. A case study can allow the researcher to examine deeply the complex relationships between the variables, which could offer a different result.

The results of this research were based on the gathered data from the head section officers in the Dubai Police because they were the best authoritative representatives to answer and describe Six Sigma, Kaizen, and benchmarking, and innovation culture and their effect on organisational performance. In the future, other participants such as top managers and employees could be solicited to assess the relationships.

The limited generalisability pointed out earlier could be improved by conducting more studies on the effect of Six Sigma, Kaizen, and benchmarking on innovation culture and organisational performance. Studies could be conducted separately to focus on each construct. Also, the model of this research could also be more assessed by

collecting data from all public entities in the Dubai Government. Studies could also be conducted in the UAE by examining the same model in different sectors. This model could also be examined empirically using data collected from other countries in the region that have different cultural practices.

The study found no significant relationship between Kaizen and organizational performance and between benchmarking and organizational performance, which contradicts with previous studies. Hence, this relationship requires an in-depth study to investigate different factors that may impact this relationship. Some moderating effects could possibly be introduced to contribute to the relationship such as training, change management, etc.

This study has focused on the effect of Six Sigma, Kaizen, benchmarking, and innovation culture on organizational performance in the Dubai Police. Hence, this study could be extended to other organizations in both the public and private sectors. Studying such model that combines these continuous improvement tools with innovation culture in other organizations particularly that manufacturers by nature could be concluded interesting results.

Finally, the R-square of organisational performance was reported to be 66 per cent, which means that the model's variables contributed 66 per cent of the variance in organisational performance. Based on this result, we can conclude that there are some other variables that may increase the rate of performance which can be considered in future studies.

## 6.7 Conclusion

The public organisational performance will persist as one of the key subjects connected to the development of the country. Consequently, the improvement of the whole organisational performance of public organisations has been the attention of all decision-makers and managers in developing countries, including the UAE. Previous studies have broadly recognised the imperative role Six Sigma, Kaizen, and benchmarking as the effective continuous improvement tools that can help organisations to boost their performance and attain competitive advantages over rivals. These tools do not receive much attention in the public sector worldwide in general and in the UAE in particular because of many reasons including the short history of these practices and strategies in the UAE. Nevertheless, the findings in this research generally provide support for the impact of Six Sigma, Kaizen, and benchmarking on organisational performance. Even though these tools were originally developed in the west and Japan, they can be useful in developing countries for improving the performance of public organisations in the UAE in general and the Dubai Police in particular.

This research tested the mediating role of innovation culture as a mechanism that can explain the association between Six Sigma, Kaizen, and benchmarking and organisational performance better. The result demonstrated that innovation culture could enhance the role of Six Sigma, Kaizen, and benchmarking in achieving higher organisational performance. Culture remains one of the important drivers in making strategies and practices successful. It plays a vital role in enhancing organisational performance by empowering employees to take actions, obtain necessary resources, and learn. In summary, the findings of this empirical research highlight how Six

Sigma, Kaizen, and benchmarking, and innovation culture can improve the organisational performance of the Dubai Police.



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## **APPENDIX A**

### **DUBAI POLICE OVERVIEW**

#### **Introduction**

The United Arab Emirates is a federal government, so it leaves much power to the emirates. There are local police in every emirate that has the power to control everything inside it. Also, the Ministry of Interior has limited power inside these emirates but has the rights to deal with external issues (Codrai, 1990; Taryam, 1987; Tomkinson, 1975).

The Dubai Police is one of the local police departments that come under the direction of H.H. Sheikh Mohammed Bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai. The Dubai Police is a police agency in Dubai which is known as the Dubai Police Headquarters. It was established on June 1, 1956, in Naif Fort. In 1973, it moved to its present location in Al Tower area by the local government of Dubai with a small number of employees. Now, it is a large organisation with more than 24,000 employees (Abdulla, Djebarni & Mellahi, 2008; Busanad, 2016; Chu, 2017; EFQM, 2018). It makes the majority of the police strength not only in the United Arab Emirates but also in the Arab world. The Dubai Police is an integral part of the UAE Police Force. It has a vision and mission to improve the quality of life by operating with constitutional rights to apply the law and maintain the safety and security of the community and all people living in the country (The Dubai Police, 2017). It uses excellent performance standards and has highly defined descriptions of their duties, tasks, and jurisdictions.

## **The Dubai Police's Excellence and Quality**

The Dubai Police applies the highest and the most precise operation in doing its work guided by performance indicators. It has efficient use of financial resources and strategic planning by avoiding bureaucratic procedures, implementing innovative initiatives, strengthening community partnership, and respecting excellence of personal and teamwork.

In its search for innovation, the Dubai Police uses the latest technologies and techniques not only to solve crimes and prevent them (Chu & Abdulla, 2014) but also in management and administration. Now, all police departments in the UAE and even the Ministry of Interior have begun to use the Dubai Police as a benchmark to get the best practices of the Dubai Police and apply them in their departments. The Dubai Police was the first department in the region that practised quality by establishing a Total Quality Department that focuses and maintains quality in all the Dubai Police departments and stations. It was also the first Arab police to apply DNA testing in criminal investigation; the first Arab force to use fingerprinting; the first in the Arab world that establishes a human rights department; the first in the Arab police institution to apply the concept of "Clean Desk Policy"; the first in the Arab department to implement a paperless department; and the first Arab police that uses GPS (Global Positioning System) (Chu & Abdulla, 2014). Additionally, the Dubai Police was first to utilise advanced technology in the mid 1980s such as the Automatic Vehicle Locator (AVL) and Loran C signals in the Gulf. Another achievement was the adoption of the Community Policing programme.

The Dubai Police is considered the most successful and advanced police in the regions because it implements and uses the latest technology in the world. Moreover, it applies

the best and most successful applied practices in the world by benchmarking. Additionally, the Dubai Police has won many prizes in quality and excellence from the government of Dubai and other external authorities and organisations, It has also received many first-place prizes in several competitions. These achievements were obtained when the leaders of the Dubai Police realised that they have to achieve the best in the world by using the last theories in management and quality and the last advanced technology (Chu & Abdulla, 2014).

The Dubai Police aims to enhance its role in human rights protection and freedom of all UAE residents in line with The Dubai Police 2015 strategy. Therefore, the Dubai Police has established a new department called the Human Rights Department that serves the community, protects their rights, and cares for their benefits by simplifying the procedures in receiving complaints and offering proper solutions. Furthermore, the UAE is the first Arab country to establish and enact a law on human trafficking based on Islamic and Arab values. The Dubai Police are engaged in forming the common Arab strategy to fight human trafficking. The Dubai Police was also the first department in the UAE to develop its electronic services, where it has set up its website and offers e-services even before the launch portal of the Dubai e-government (Sethi & Sethi, 2008).

### **The Dubai Police's Strategy**

**Policy:** Policies and principles that govern the development of the strategic plan of the Dubai Police are (The Dubai Police, 2018):

Policies and principles that governed the development of the strategic plan of Dubai Police:

Dubai's Security is an integral part of the security of the United Arab Emirates.

Security is an acquired right of every citizen, resident and visitor.

Law is the arbitrator in dealing with each wrongdoer to the state or to any human being.

Citizens given the utmost priority as to recruitment and training.

**Vision:** Police Pioneering for a safe city.

**Mission:** We strive to make Dubai the safest and most secured city, through providing innovative smart services, global institutional excellence and professional development in alignment with modern technology utilized in an environment that promotes innovation and creativity aiming for community happiness.

**Values:** Transparency; Cooperation; Justice; Professionalism and Team Spirit.

**Strategic goals:** The Dubai Police has three strategic directions, each of which has strategic goals as follows:

Table a  
*Strategic Goals of Dubai Police*

Strategic Directions	Strategic Goals
Society Happiness	Safety and Security Enrichment.
	Confidence in Police.
	Community Happiness.
Secure City	Safekeeping and Protection.
	Crises and Disaster Management.
	Crime Reduction Rate.
	Responding to Emergency Situations.
	Road Fatalities Reduction.
Innovation in Organization Capabilities	Managing the Human capital effectively and Efficiently.
	Managing the physical resources effectively and efficiently.
	Managing the Technical Resources effectively and efficiently.

Enhance institutional performance effectively and efficiently.
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Commitments and Pledges:

- The Dubai Police pledges to answer your 999 calls within ten seconds.
- The Dubai Police pledges to arrive at urgent incidents within the specified time.
- The Dubai Police pledges to have a police officer in the following situations:
  - Disturbing reports.
  - Incidents of fatalities.
  - Critical casualties.
  - Strikes and riots.
  - Disasters and crises.
- The Dubai Police pledges to provide victims of crime on the preliminary status of cases within seven working days.
- The Dubai Police pledges to be transparent in publishing facts and information in appropriate time unless public benefit requires otherwise.
- The Dubai Police pledges to reply to your correspondences within five working days.
- The Dubai Police pledges to provide services to customers in a duration that does not exceed 30 minutes at customer happiness centres at police departments and stations.

- The Dubai Police pledges to respond to your electronic inquiries within two working days.
- The Dubai Police pledges to provide state-of-art highly efficient services aiming for customer happiness.

### **The Dubai Police's Organisational Structure**

The Dubai Police consists of a unique hierarchy that has general departments and police stations. Each of these general departments contains of sub-departments, and each of police station contains sections. These general departments have unique tasks, objectives and responsibilities that are different from each other.

#### **a) General Department of Administrative Affairs**

The main goal of the General Department of Administrative Affairs is to link the General Headquarters of the Dubai Police with other departments and police stations in the Dubai Police internally and externally with the General Headquarters and federal ministries, the private sector, foreign bodies, and local departments (Abdulla, 2009). This department is also concerned with all incoming and outgoing transactions such as letters and messages, supervises knowledge projects and deploy them in the organisation, and meets requests for treatment of employees abroad.

#### **b) General Department of Airports Security**

Dubai is considered a centre and destination for most international airlines. It has three international airports that receive airlines from different countries. This development in Dubai airports enforces the Dubai Police to establish a special department that takes care of them. The General Department of Airports Security has more than 6500

employees working 24 hours to provide security inside the airports (The Dubai Police Annual report, 2015). It is responsible for inspecting aeroplanes and travellers. They also help travellers in the case of lost luggage. Moreover, this department provides training to its employees to enable them to deal with the newest cases and situation of inspections.

**c) General Department of Criminal Investigation**

The Criminal Investigation Department represents the backbone of security work in the Dubai Police. It is the front desk of other departments that deal directly with people in Dubai and supervise police stations. It aims to excel in spreading security and stability in the society. In other words, its role is to control crime in all forms by developing and employing ways to prevent them for the sake of social stability. It deals with all kinds of crimes such as daily crimes (quarrels, defamation, swearing), crimes that are dangerous (murder, robbery, rape, armed), and organised crimes (drug, money laundry, trafficking, wanted criminal). It also meets social services (lost and found, licenses of all kinds, certificate of good conduct), employs scientific evidence (forensic medicine, documents, fingerprints), and uses and develops crime prevention methods (follow-up, guidance, statistical projections, directives).

**d) General Department of Punitive and Correctional Establishments**

The General Department of Punitive and Correctional Establishments deals with convicted felons to receive criminal punishment, their reform, and remedy. The main responsibilities of the department are to implement the judgments issued by the competent courts and preparing and implementing plans and programmes for the rehabilitation of inmates of penal and correctional institutions.

**e) General Department of Traffic**

The General Department of Traffic is one of the most important departments in the Dubai Police. Its main responsibility is to provide police services to the community such as instructions pertaining to traffic, enforcement of law and regulations, traffic road and flow control, and increasing traffic control to reduce traffic accidents. For all these purposes, the traffic department employs up-to-date systems and technologies and servicing policies.

**f) General Department of Anti Narcotic**

The General Department of Anti Narcotic was established in the beginning under the Criminal Investigation Department. The Dubai Police' decision-makers realised the important role of the Dubai Police in anti-drugs; therefore they established a general department for this purpose. It is responsible for protecting society and its members from drugs, searching for sources of drugs, arresting suppliers of drugs, following up addicted people, and providing society with awareness programmes about drugs and their impact on people, families, and societies.

**g) General Department of Operation**

The General Department of Operation is considered the heart of the Dubai Police. It has different departments that deal around-the-clock with society such as controlling room. It also controls all police patrols' electronics and wireless devices whether in a police car, streets, air patrols, or sea patrols. Moreover, it protects significant commercial and community sites by using an advanced security system called an "early warning system". The Operation Department also supports coordination and cooperation with emerging states. In brief, it is the link between all departments and police stations via a controlling room with advanced technology and installations.

**h) General Department of Organisations Protective Security and Emergency**

The role of this department is to provide security to various organisations and agencies in Dubai, such as international organisations and their offices, and governmental and private buildings, and visitors such as presidents, kings, Sheikhs, ministers, and delegates. It also provides Dubai during demonstrations.

**i) General Department of Human Rights in the Dubai Police**

As community police, the Dubai Police believes in human rights. Therefore, it established the Human Rights Department in 1995. Its strategy is to preserve the rights of people among those with special needs. Its objectives are also to integrate the most care-needy groups in the society, providing these groups with physiological and social security, developing and enhancing their potential capabilities, and addressing the issues pertinent to them by providing the suitable solutions for those issues.

**j) General Department of Finance**

The main role of this department is managing accounting and financial transactions and reports of the Dubai Police such as controlling financial inflows and outflows, crediting salaries of employees to their bank accounts, controlling general ledger, following up fixed assets, generating financial reports that can be used by departments or decision makers, paying invoices to suppliers, and controlling the Dubai Police's budget.

**k) General Department of Human Resources**

Since the beginning, the Dubai Police has adopted an open-ended security strategy aligned with modernisation. This modernisation needs employees to be developed to

align with the development in policing. For this purpose, the Dubai Police has established an HR department to take care of its employees. Every employee in the Dubai Police has a personal file that contains all his or her employment history such as recruitment, retirement or resignation (Abdulla, 2009). The department manages employees in the Dubai Police including recruiting suitable candidates, ensuring that employee welfare and employee relations are positive, ensuring that the working environment is safe for employees, raising awareness of current workplace legislation, and overseeing employee appraisal.

#### **l) General Department of Community Happiness**

The role of the Dubai Police is not only to protect people and secure Dubai but also acts as a community organisation. Modern police should follow the new concept of community policing by providing services that can involve people into a police role. The General Department of Community Happiness is a link between the Dubai Police and people in society. It provides services and programmes that help community members to act with the Dubai Police as a security organisation that takes care of their security. The department has different sub-departments and sections such as an officer club, the Dubai Police's museum, library, and international training. Moreover, it has an annual programme called "Education Security" which focuses on students in schools where trainers from the Dubai Police visit the schools in Dubai weekly to give them talks about the role of security in the society and how to protect themselves.

#### **m) General Department of Services and Supplies**

The Services and Supplies Department was established in 1970 to provide a service facility such as supermarkets and clinics. Nowadays, its role is more than that. It now has many sub-departments that focus on providing services and supplies to other

departments. It consists of purchasing department, supplies and warehouse department, maintenance department, engineering department, police clinics, and others. These departments provide services to other department and employees of the Dubai Police. It also has the right to make a contract with suppliers. Moreover, it is responsible for establishing buildings and controlling accommodations.

**n) General Department of Artificial Intelligence**

The General Department of Artificial Intelligence is considered one of the most recent departments in the Dubai Police to align with the strategy of the Dubai Government to be an e-Government. The General Department of Artificial Intelligence has different roles and tasks such as supervising the transformation of an electronic government, supervising all technical issues such as software, computer, networks, and the Dubai Police's portal. It also provides IT services to other departments by internally developing the e-Services system or securing it externally. It also trains employees to use new equipment and systems.

**o) General Department of Excellence and Pioneering**

The Dubai Police has realised early the important role of TQM in public organisations. It was the first department that implements TQM. The role of this department is to promote awareness of TQM among employees. It is also responsible for benchmarking, best practices, participating in excellence awards, evaluating institutional performance, Six Sigma, strategic planning, and other roles.

**p) The Dubai Police Academy**

The Dubai Police Academy was founded in 1987 at the Dubai Police College. The Academy has different colleges and grants many certificates such as diploma, BA,

masters and PhD. It is also responsible for training new military employees such as officer candidates, constables, and those from other departments such as civil defence, immigration department, and other security companies.

**q) Future Foresight and Decision-Making Support Centre**

The Future Foresight and Decision Making Support Centre was opened in December 1990 to serve as a central information and decision support system in the Dubai Police. It aims to provide specialised studies and research and support and develop security policies.

**r) General Department of Training**

The General Department of Training is responsible for studying and analysing the needs and requirements of the police. It provides training courses, workshops and conferences to all employees of the Dubai Police. It also analyses the effectiveness of the training programmes offered.

**s) Headquarters Regulatory Office**

The Headquarters Regulatory Office contains six sub-departments responsible for transmitting orders, decisions and instructions issued by the commander to all members of the Dubai Police.

**t) General Department of Transport and Rescue**

The main role of this department is to conduct rescue operations such as aircraft crashes, natural disasters, weather fluctuations, building collapses and other emergency and daily accidents. The other role is to provide and supervise transportation to all employees in the Dubai Police.

**u) Police Stations**

The Dubai Police has eleven police stations under the assistant command for criminal investigation. These police stations are the front office that deals with people in society in Dubai. Their role is to receive peeps and notification from people. They also deal with all issues under their controlling area such as controlling roads, investigating crimes, and catching and following up wanted criminals. The police stations are: Al Muraqabat Police Station, Bur The Dubai Police Station, Al Rifa'a Police Station, Naif Police Station, Al Qusais Police Station, Al Rashidya Police Station, Hatta Police Station, Ports Police Station, Jabal Ali Police Station, Al Brarshaa Police Station, and Nad Alsheba Police Station.



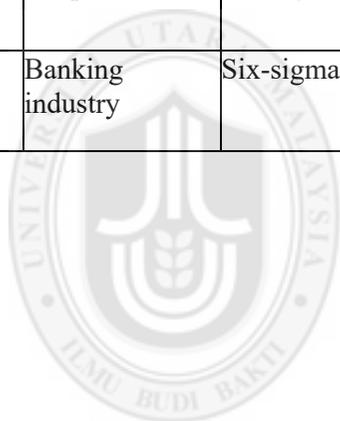
**APPENDIX B-1**  
**STUDIES OF SIX SIGMA AND ORGANIZATIONAL PERFORMANCE**

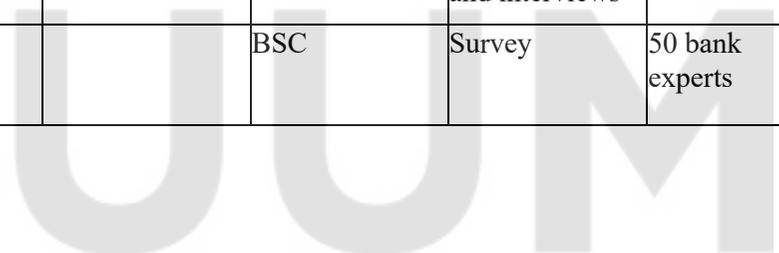
Author	Context		Variables			Methodology		Analysis Techniques	
	Country	Industry	IVs	Intervening Variables	DV	Res. design	Population	Unit of analysis	Technique
Hwang et al. (2017).	South Korea	General	Structured methods	Exploitation and exploration	Performance	Questionnaire	255	Organization	SEM
Gunawan and Karimah (2017).	Indonesia	Manufacturing companies	Six Sigma Criteria		Performance of accounting system	Questionnaire	80	Individual	Regression
Kumar et al. (2009)	UK	Manufacturing SMEs	Six Sigma		Organizational performance	Questionnaire	500	Organization	Descriptive analysis (mean)
Swink and Jacobs (2012).	General	Manufacture industries	Six Sigma		Operating performance	Using an event study methodology	200	Organization	(median)
Shah et al. (2008).	United States	Manufacturing	Six Sigma	Lean practices	Firm performance	Survey	2511	Organization	regression

Zu et al. (2008).	United States	Manufacturing plants	Top management Support  Six Sigma	Quality information	Quality performance  Business performance	Survey	226	Organization	Correlation and regression
Braunscheidel et al. (2011).	Anonymous	Manufacturing industries	Six sigma adoption	Six sigma implementation	Performance improvements	Case study (interviews)	7	Organization	Qualitative
Linderman et al. (2006).	None	High-tech manufacturing firm	Goals in improvement teams	Six Sigma	Performance	Questionnaire	One company (1500 projects) Black belt	Individual	Correlation and regression
Sin et al. (2015).	Malaysia	Manufacturing firms	Knowledge	Six Sigma Project Success	Organizational Performance	Survey	364	Organization	Correlation and regression
Mustafa and Jamaluddin, (2017)	Malaysia	manufacturing industry	Six Sigma		Organizational performance	Questionnaire	219	Organization	Correlation and regression
Patyal and Koilakuntla, (2017)	India	manufacturing organizations	TQM Six Sigma		Quality performance  Business performance	Questionnaire	262	Organizational	Correlation and regression

Gutierrez Gutiérrez, Lloréns-Montes, and Bustinza Sánchez (2009).	European Countries	Manufacturing & services firms	Teamwork statistical process control in Six Sigma	Shared vision	Organizational Performance	Questionnaire	237 firms	Organization	Regression
Ali et al. (2016).	Malaysia	Manufacturing companies	Lean Six Sigma	Operational performance	Business performance: a. Financial performance b. Non-financial performance	Questionnaire	360	Individual	regression
Uluskan, et al. (2017).	United States	Textile and apparel industry	Process Management  Employee relationship management  Top management	Six Sigma  Customer relationship management	Performance	Survey	115	Organization	SEM
Habidin and Yusof (2012).	Malaysia	Automotive Industry	Lean Six Sigma. Strategic control system	Moderator: ISO 14001	organizational performance	Survey	252	Organization	Regression

Jacobs et al. (2015).	General	Firms adopted Six Sigma	Six Sigma		Performance	Using an event study methodology	214	Organization	Regression
Ozkan et al. (2017).	General	Fortune 500 companies	Six Sigma		Operating performance	Collect data from reports	108	Organizational	Descriptive
Shafer and Moeller (2012).	General	Overall industry	Six Sigma		Corporate performance	Using an event study methodology	400	Organization	Descriptive
Hilton et al. (2008).	Australia	Hospitals	Six Sigma		Performance.	Questionnaires and interviews	17 hospitals	Organization	Correlation
Nayeri and Rostami (2016).	Iran	Banking industry	Six-sigma		BSC	Survey	50 bank experts	Organization	SEM



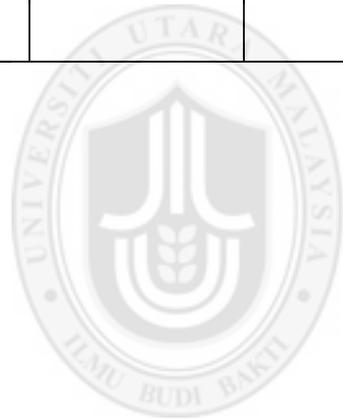
  
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**APPENDIX B-2**  
**STUDIES OF KAIZEN AND ORGANIZATIONAL PERFORMANCE**

Author	Context		Variables			Methodology		Analysis Techniques	
	Country	Industry	IVs	Intervening Variables	DV	Res. design	Population	Unit of analysis	Technique
Zarinah et al. (2017).	Malaysia	Manufacturing firms	Lean production	Moderator: leadership style	Business performance	questionnaires	44	Organization	Correlation and Regression
Asaad et al. (2015).	Malaysia	Malaysian Automotive Company	5S Kaizen		Organizational performance	questionnaire	63 Automotive companies	Organization	Rasch model
Rahman et al. (2010).	Thailand	manufacturing firms	Lean		Operational performance	Questionnaire	187 companies	Organization	multiple regression
Anh et al. (2015).	Vietnam	Manufacturing companies	Kaizen Practices		Quality performance	Questionnaire	124 companies	Individual	Regression
Yasar et al. (2017).	Turkey	Manufacturing industry	Innovation	Continuous improvement	Financial performance	Questionnaire	384 manufacturing firms		Correlation and regression

Zhou (2016).	United States	SMEs	Lean tools		Performance	questionnaire	200 SMEs	Organization	A hierarchical cluster analysis
Hofer et al. (2012).	general	Operations, production, supply chain, logistics, and purchasing managers and executives	Lean Production Bundles	Inventory Leanness (moderator)	Financial Performance	Survey and secondary data	4288 APICS members	Organization	Correlation and COMPUSTAT
Fullerton et al. (2003).	United States	Manufacturing firms	Lean production implementation		Profitability, cash flow margin, ROA	Questionnaire and secondary data	253 firm	Organization	Regression and COMPUSTAT
Yang et al. (2011).	International	Manufacturing firms	Lean manufacturing	Mediator: Environmental Management Practices	Market Performance Environmental Performance Financial Performance	Survey	309 international manufacturing firms	Organization	SEM
Shah et al. (2017).	unknown	Food and Beverage Industries	Lean Practices		Organizational performance	Questionnaires and interview	Two companies	Organization	Descriptive analysis

Sajan et al. (2017).	India	Manufacturing SMEs	Lean practices		sustainability performances	Survey	252 manufacturing SMEs	Organization	SEM
Zailani et al. (2015).	Malaysia	Manufacturing industry	Kaizen		Organizational capabilities	Qualitative methodology through a semi-structured interview	Two organizations		



**APPENDIX B-3**  
**STUDIES OF BENCHMARKING AND ORGANIZATIONAL PERFORMANCE**

Author	Context		Variables			Methodology		Analysis Techniques	
	Country	Industry	IVs	Intervening Variables	DV	Res. design	Population	Unit of analysis	Technique
Zoakah et al., (2017).	Nigeria	Foods and beverage	Benchmarking		Financial Performance		One firm	Organization	Regression
Abazeed (2017).	Jordan	Industrial Companies	Benchmarking Culture		Operational Performance	Questionnaire	50 industrial companies 315 questionnaires	Individual	Regression
Kariuki and Ochiri (2017).	Kenya	Githunguri Dairy Cooperative Society	Human Resource Planning  Mentoring Programs  Benchmarking Programs		Organizational Productivity	Questionnaire	165 senior and middle level managers	Organizational	Regression

			Strategic Training Programs						
Salam and Smadi (2016).	Thailand	Consumer goods (FMCG) industry	Benchmarking Standardization	Purchasing Performance (mediator)	Business Performance	Questionnaire	583 purchasing executives and managers	Organizational	SEM
Mehralian et al. (2017)	Iran	Pharmaceutical distribution companies	TQM (13 dimensions including benchmarking)		BSC	Questionnaire	30 companies	Organizational	SEM
Carr and Smeltzer (1999).	general	National Association of Purchasing Management members	Benchmarking		Firm Performance Strategic Purchasing	Survey	2,260 members	Organizational	Correlation and regression
Drew (1997).	North American	Firms (general)	Benchmarking		Performance	Questionnaire	825 managers	Organization	Descriptive analysis
Sawasdiraksa, (2015).	Thailand	Food and beverage industry	benchmarking, standardization, and purchasing		Business performance	Survey	260	Organization	SEM
Voss et al. (1997).	European countries	Manufactures companies	Benchmarking		Operational and business performance	Structured interviews	660 planet sites	Organization	Regression

Sanchez-Rodriguez et al. (2003).	Spain	Manufacturing companies in Spain.	Benchmarking		Purchasing performance business performance	Questionnaire	1,182 purchasing managers	Organization	SEM
Attiany (2014).	Jordan	Jordanian industrial companies	Benchmarking		Competitive advantage	Questionnaire	228 managers	Organization	Regression
M'itonga (2017).	Kenya	Bamburi Cement Limited	Benchmarking Levels	Politics, Culture, Government legislation and regulations	Organization Development: (• Active support of senior team in OD activities • Consistent levels of teams • Return on investments • Awareness of OD values)	Questionnaire	500 employees of Bamburi Cement Limited,	Organization	Regression
Attiany (2009)	Jordan	Jordanian pharmaceutical firms	benchmarking		Institutional performance	Questionnaire	228	Organization	regression
Hashim et al. (2012a).	Malaysia	Local authorities	Benchmarking Process		Organizational Performance	Structured interviews	35 local authorities	Organization	correlation

Kerandi et al. (2014).	Kenya	Commercial Banks	Benchmarking Process		Organizational Performance	Semi-structured questionnaire	50 respondents of 25 banks	Organization	Correlation and regression
Jarrar and Zairi (2001).	UK	General	Benchmarking		Competitive advantage	Questionnaire	227 organizations	Organization	Descriptive analysis
Nyaoga et al. (2013).	Kenya	Public secondary schools in Nakuru Municipality	Benchmarking	Politics culture (Moderator)	Performance	Survey	152 respondents	Organization	Correlation
Maiga and Jacobs (2004).	United States	Manufacturing plants	Benchmarking	Control variables: Size Industry	Organizational Performance	Questionnaire	157	Organization	Correlation
Parast and Adams (2012).	Countries in the Middle East	Petroleum industry	Benchmarking Quality Citizenship		Internal quality results External quality results	Survey	61 companies	Organization	Correlation and regression

**APPENDIX B-4**  
**STUDIES OF INNOVATION CULTURE AND ORGANIZATIONAL PERFORMANCE**

Author	Context		Variables			Methodology		Analysis Techniques	
	Country	Industry	IVs	Intervening Variables	DV	Res. design	Population	Unit of analysis	Technique
Lee et al (2017a).	India	Software organizations	Pro-innovation culture	Managerial ambidexterity	Performance outcomes	Questionnaire	416	Organization	Regression
Anderson et al. (2012).	Tunis	Tunisian small ICT companies	Innovation culture		Economic performance	Questionnaire	300 ICT firms	Organization	Regression
De Brentani and Kleinschmidt (2004).	North American	business to-business firms	Innovation culture		Performance	Survey	252 firms	Organization	Correlation
De Brentani, (2001).	Canada	business services	Company-related factors market-related factors product-related success factors		Incremental innovations Discontinuous innovations	Questionnaire	184 firms	Organization	Correlation and regression

			new product process factors						
Wei et al. (2012).	China	multinational company	Innovation culture	organizational transformational capability	Creativity and innovation performance	Questionnaire	280	Organization	Regression
Kuo and Tsai (2017).	General	Large steel company	Bureaucratic culture Innovative culture Supportive culture	Management maturity	Organizational performance	Questionnaire	9000 employees	Organization	Regression
Stock et al. (2013).	United States	Electronics, machinery, services, software/IT, and utilities	Innovation-oriented Cultural Values Innovation-oriented Cultural Norms Innovation-oriented Cultural Artifacts	Moderators: Market Dynamism Technological Turbulence Mediator: Product Program Innovativeness	Business Performance	Survey	1000 managers	Organization	SEM
Zhang and Huang (2010).	China	SMEs	Innovation culture	Transformational capabilities	Transformational performance	Questionnaire	275 SMEs	Organization	Regression

Naranjo-Valencia et al. (2016).	Spain	Industrial companies	Organizational culture innovation		Performance	Questionnaire	1600 companies.	Organization	Correlation and regression
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**APPENDIX C-1**  
**SIX SIGMA DIMENSIONS IN PERVIOUS STUDIES**

Six Sigma Dimensions	Source	Context
<ul style="list-style-type: none"> <li>• Top management support</li> <li>• Customer relationship</li> <li>• Supplier relationship</li> <li>• Workforce management</li> <li>• Quality information</li> <li>• Product/service design</li> <li>• Process management</li> <li>• Six Sigma role structure</li> <li>• Six Sigma structured improvement procedure</li> <li>• Six Sigma focus on metrics</li> </ul>	Ngo (2010)	Manufacturing firms in the New Zealand context
<ul style="list-style-type: none"> <li>• Linking six sigma to business strategy</li> <li>• Customer focus</li> <li>• Project management skills</li> <li>• Management commitment and involvement</li> <li>• Organisational infrastructure</li> <li>• Understanding of six sigma methodology</li> <li>• Project selection and prioritisation</li> </ul>	Antony et al (2007)	UK service sector

<ul style="list-style-type: none"> <li>• Integration of six sigma with financial accountability</li> <li>• Management of cultural change</li> <li>• Training and education</li> <li>• Project tracking and reviews</li> <li>• Incentive program</li> <li>• Company-wide commitment</li> </ul>		
<ul style="list-style-type: none"> <li>• Leadership</li> <li>• Structured improvement procedure</li> <li>• Quality information and analysis</li> <li>• Supplier relationship</li> <li>• Just in time</li> <li>• Customer focus</li> <li>• Focus in metric</li> </ul>	Habidin and Yusof (2013)	Malaysian automotive industry
<ul style="list-style-type: none"> <li>• Leadership</li> <li>• Structured improvement procedure</li> <li>• Quality information and analysis</li> <li>• Supplier relationship</li> <li>• Just in time</li> <li>• Customer focus</li> <li>• Focus in metric</li> </ul>	Habidin et al. (2016)	Malaysian automotive industry

<ul style="list-style-type: none"> <li>• Top management support</li> <li>• Customer relationship</li> <li>• Supplier relationship</li> <li>• Workforce management</li> <li>• Quality information</li> <li>• Product/service design</li> <li>• Process management</li> <li>• Six Sigma role structure</li> <li>• Six Sigma structured improvement procedure</li> <li>• Six Sigma focus on metrics</li> </ul>	<p>Zu et al. (2010).</p>	<p>US manufacturing plants</p>
<ul style="list-style-type: none"> <li>• Six Sigma role structure</li> <li>• Six Sigma structured improvement procedure</li> <li>• Six Sigma focus on metrics</li> </ul>	<p>Zu et al. (2008)</p>	<p>US manufacturing plants</p>
<ul style="list-style-type: none"> <li>• Leadership</li> <li>• Costumer focus</li> <li>• Structured improvement procedure</li> <li>• Focus in metrics</li> </ul>	<p>Khaidir et al. (2013)</p>	<p>Malaysian Healthcare Industry</p>
<ul style="list-style-type: none"> <li>• Management involvement and commitment</li> <li>• Cultural change</li> <li>• Communication</li> </ul>	<p>Brun (2011)</p>	<p>Italian companies</p>

<ul style="list-style-type: none"> <li>• Organizational infrastructure and culture</li> <li>• Education and training</li> <li>• Linking six sigma to business strategy</li> <li>• Linking six sigma to customer</li> <li>• Linking six sigma to human resources</li> <li>• Linking six sigma to suppliers</li> <li>• Understanding tools and techniques within six sigma</li> <li>• Project management skills</li> <li>• Project prioritization and selection</li> </ul>		
<ul style="list-style-type: none"> <li>• Top Management Support</li> <li>• Six Sigma Role Structure</li> <li>• Six Sigma Focus on Metrics</li> <li>• Six Sigma Improvement Procedure</li> </ul>	<p>Shafer and Moeller (2012).</p>	<p>General</p>
<ul style="list-style-type: none"> <li>• Top management commitment</li> <li>• Education and training</li> <li>• Cultural change</li> <li>• Customer focus</li> <li>• Clear performance metrics</li> <li>• Attaching success to financial benefits</li> <li>• Organizational understanding of work processes</li> </ul>	<p>Chakrabarty and Chuan (2007)</p>	<p>Singapore service industries</p>

<ul style="list-style-type: none"> <li>• Information utilization</li> <li>• Standardization</li> <li>• Promotion</li> <li>• CEO's will</li> <li>• Communication</li> <li>• Training</li> <li>• Policy</li> </ul>	<p>Choi et al. (2012)</p>	<p>Samsung company</p>
<ul style="list-style-type: none"> <li>• Top management support and commitment</li> <li>• Six Sigma role structure</li> <li>• Information &amp; data system</li> <li>• Six Sigma structured improvement procedure</li> <li>• Six Sigma focus on metrics</li> </ul>	<p>He et al. (2017)</p>	<p>Companies in China</p>
<ul style="list-style-type: none"> <li>• Senior Management Commitment and Involvement,</li> <li>• Striving for Higher Quality Performance,</li> <li>• Six Sigma Team Management System,</li> <li>• Customer Focus,</li> <li>• Internal Quality System</li> </ul>	<p>Or (2008).</p>	<p>Manufacturing company</p>
<ul style="list-style-type: none"> <li>• Management involvement and commitment</li> <li>• Cultural change</li> <li>• Communication</li> </ul>	<p>Coronado and Antony (2002)</p>	<p>General</p>

<ul style="list-style-type: none"> <li>• Organization infrastructure</li> <li>• Training</li> <li>• Linking Six Sigma to business strategy</li> <li>• Linking Six Sigma to customers</li> <li>• Linking Six Sigma to human resources</li> <li>• Linking Six Sigma to suppliers</li> <li>• Understanding tools and techniques within Six Sigma</li> <li>• Project management skills</li> <li>• Project prioritization and selection</li> </ul>		
<ul style="list-style-type: none"> <li>• Quantified functional impact</li> <li>• Continued top management support and enthusiasm</li> <li>• The emphasis on a quantitative and disciplined approach</li> <li>• The value placed on understanding and satisfying customer needs</li> <li>• Combining the right projects, the right people, and the right tools</li> </ul>	<p>Hahn, Hill, Hoerl, and Zinkgraf (1999).</p>	<p>Conceptual framework</p>
<ul style="list-style-type: none"> <li>• Strong proactive support with required resources provided by top management</li> <li>• Acceptance and implementation of Six Sigma's basic disciplines by employees</li> </ul>	<p>Yun and Chua (2002)</p>	<p>Samsung corporation</p>

<ul style="list-style-type: none"> <li>• Linkage with all innovative and infrastructure activities</li> <li>• Accurate and fair evaluation of all successful Six Sigma projects with meaningful recognition and rewards for employees</li> </ul>		
<ul style="list-style-type: none"> <li>• Management commitment and visible support</li> <li>• Treatment of Six Sigma as a holistic concept</li> <li>• Investment of adequate resources</li> <li>• Focus on results</li> <li>• Customer orientation</li> <li>• Follow-up and communication of success stories</li> <li>• Focus on training and its content</li> <li>• Adaptation to an organization's situation and needs</li> <li>• Development of strategy to introduce Six Sigma</li> <li>• Prioritization and selection of projects</li> <li>• Development of uniform language and terminology</li> <li>• Responsiveness to external influences.</li> </ul>	<p>Sandholm and Sorqvist (2002)</p>	<p>Conceptual framework</p>

**APPENDIX C-2**  
**KAIZEN DIMENSIONS IN PERVIOUS STUDIES**

Kaizen Dimensions	Source	Context
<ul style="list-style-type: none"> <li>• Management Support</li> <li>• Goal Clarity</li> <li>• Goal Difficulty</li> <li>• Tool Quality</li> <li>• Action Orientation</li> <li>• Team Autonomy</li> <li>• Event Planning Process</li> <li>• Work Area Routineness</li> <li>• Team Leader Experience</li> <li>• Functional Heterogeneity</li> <li>• Tool Appropriateness</li> <li>• Team Kaizen Experience</li> <li>• Internal Processes</li> <li>• Affective Commitment to Change</li> </ul>	Farris (2006)	Manufacturing organizations
<ul style="list-style-type: none"> <li>• Management Support</li> <li>• Goal Clarity</li> <li>• Goal Difficulty</li> <li>• Work Area Routineness</li> </ul>	Glover et al. (2011)	Manufacturing organizations

<ul style="list-style-type: none"> <li>• Learning and Stewardship</li> <li>• Experimentation and Continuous Improvement</li> <li>• Institutionalizing Change</li> <li>• Improvement Culture</li> <li>• Performance Review</li> <li>• Avoiding Blame</li> <li>• Accepting Changes</li> <li>• Work Area Attitude and Commitment</li> </ul>		
<ul style="list-style-type: none"> <li>• Training and education</li> <li>• Communication process</li> <li>• Documentation and evaluation</li> <li>• Workers integration and award</li> <li>• Management commitment</li> <li>• Costumer focus</li> </ul>	<p>Garcia, Rivera, and Iniesta (2013)</p>	<p>Manufacturing industries</p>
<ul style="list-style-type: none"> <li>• Application of methodologies to understand customer's voice,</li> <li>• Resistance to change,</li> <li>• Consistent approach to improvement activities and development of structures to stop the bugs,</li> <li>• Make operating practices,</li> <li>• Establishment of long-term goals,</li> </ul>	<p>Landa (2009)</p>	

<ul style="list-style-type: none"> <li>• Shaping a learning organization</li> <li>• Focus on development of critical processes and quality management systems</li> </ul>		
<ul style="list-style-type: none"> <li>• Impact on work area</li> <li>• Impact on participant</li> <li>• Understand kaizen need</li> </ul>	<p>Norazlan, Habidin, Roslan and Zainudin (2014).</p>	<p>Malaysian Health Industry</p>
<ul style="list-style-type: none"> <li>• Self-contained short-term intervention (typically three to five days), with a clearly defined, finite life</li> <li>• Focused on part of a specific value stream</li> <li>• Low capital intervention.</li> <li>• Team based, comprised of employees from targeted work area and support function</li> <li>• Action oriented</li> <li>• Goals are measurable</li> <li>• Designed to create a cycle continuous improvement</li> </ul>	<p>Melnyk et al. (1998)</p>	<p>American firms</p>
<ul style="list-style-type: none"> <li>• Participation in decision making</li> <li>• Perception of communication</li> <li>• Training and education</li> <li>• Respect for top management</li> <li>• Employee involvement</li> <li>• Perceived quality performance</li> </ul>	<p>Venkataiah and Sagi (2012)</p>	<p>Indian Automobile Industry</p>

<ul style="list-style-type: none"> <li>• Resource availability</li> <li>• Recognition of need for change</li> <li>• Culture that support change</li> <li>• Kaizen program champion quality</li> <li>• Team leader quality</li> <li>• Management support</li> <li>• Employee turnover</li> <li>• Communication quality</li> <li>• Measurement system alignment</li> <li>• Ability to financially justify even</li> </ul>	<p>Rich and Bateman (2003)</p>	<p>British automative manufacturing</p>
<ul style="list-style-type: none"> <li>• Employee involvement</li> <li>• Job security</li> <li>• Training</li> <li>• Employee needs surveys</li> <li>• Standard operating procedures (SOPs) Follow-up reviews</li> <li>• Time for completion of action items</li> <li>• Strategic alignment</li> <li>• Knowledge sharing</li> </ul>	<p>Patil (2003)</p>	<p>Manufacturing organization</p>
<ul style="list-style-type: none"> <li>• Attitude</li> <li>• Impact on work area</li> <li>• Impact on participant</li> </ul>	<p>Doolen et al. (2008)</p>	<p>Supplier and manufacturer comapany</p>

<ul style="list-style-type: none"> <li>• Skill</li> <li>• Understanding need for change</li> <li>• Understanding need for Kaizen</li> </ul>		
<ul style="list-style-type: none"> <li>• Follow-up Activities</li> <li>• Working Area Impact</li> <li>• Employee Skill and Effort</li> </ul>	Hashim et al. (2012b)	Malaysian automotive industry
<ul style="list-style-type: none"> <li>• Experimentation and continuous improvement</li> <li>• Learning and stewardship</li> <li>• Institutionalizing change</li> <li>• Avoiding blame</li> <li>• Improvement culture</li> <li>• Performance review</li> <li>• Accepting changes</li> <li>• Impact on Area Post Implementation</li> </ul>	Glover et al. (2015).	Manufacturing organisations.

**APPENDIX C-3**  
**INNOVATION CULTURE DIMENSIONS IN PERVIOUS**  
**STUDIES**

Construct studied	Dimensions	Author	Context
Innovation culture	<ul style="list-style-type: none"> <li>• Developing innovation Facilitating employees' innovative behaviours</li> <li>• The level of organizational culture favourable to exploring new opportunities</li> </ul>	Sattayaraksa and Boon (2016).	Manufacturing firms of five industries in Thailand
Innovation culture	<ul style="list-style-type: none"> <li>• My organization promotes creativity, innovation and/or the development of new ideas, as cultural values.</li> <li>• My organization encourages experimentation and innovation in order to improve work processes.</li> <li>• A common system of values, beliefs and objectives exists in my organization, directed towards innovation.</li> <li>• In the last three years, the number of product innovations developed by my organization is higher than my competitors'.</li> <li>• The percentage of sales with respect to new products, on the</li> </ul>	Martin-de Castro et al. (2013)	High and medium-high technological manufacturing firms

	<p>total of sales, is higher than the one of my competitors.</p> <ul style="list-style-type: none"> <li>• In the last 3 years, the number of new products with respect to my product portfolio is higher than the one of my competitors.</li> </ul>		
Innovation culture	<ul style="list-style-type: none"> <li>• Market orientation</li> <li>• Collaborative sharing</li> <li>• Change consciousness</li> <li>• Risk-taking these six dimensions</li> <li>• Leading practice</li> <li>• Decision-making involvement</li> </ul>	Wei et al. (2012).	SMEs in China
Innovation culture	<ul style="list-style-type: none"> <li>• Market orientation</li> <li>• Value orientation</li> <li>• Creativity and empowerment</li> <li>• Innovation propensity</li> </ul>	Dobni (2008)	Financial services industry
Innovation culture	<ul style="list-style-type: none"> <li>• Strategy</li> <li>• Communication</li> <li>• Structure</li> <li>• Behaviors that encourage innovation</li> <li>• Support mechanisms</li> </ul>	Padilha and Gomes (2016)	Textile industry

Innovation culture	<ul style="list-style-type: none"> <li>• Strategy</li> <li>• Communication</li> <li>• Structure</li> <li>• Behaviors that encourage innovation</li> <li>• Support mechanisms</li> </ul>	Martins and Terblanch (2003a).	Literature study
Innovation culture	<ul style="list-style-type: none"> <li>• Power sharing</li> <li>• People and career development</li> <li>• Participative decision making</li> <li>• Support and collaboration</li> </ul>	Hurley (1995).	R &D agency
Innovation culture	<ul style="list-style-type: none"> <li>• Encouraging creativity</li> <li>• Being receptive to new ideas</li> <li>• Decentralising decision-making</li> <li>• Encouraging open communication</li> </ul>	Deshpande et al. (1993) Scaling by O'Cass & Ngo (2007).	General
Innovation culture	<ul style="list-style-type: none"> <li>• Encouraging new ideas</li> <li>• Creating inter-departmental teams</li> <li>• Decentralization of decision-making</li> </ul>	Olmos-Peñuela, García-Granero, Castro-Martínez, and D'Este (2017).	SMEs
Knowledge-cantered culture	<ul style="list-style-type: none"> <li>• There has been a common language to support knowledge exchange and sharing between employees and departments.</li> </ul>	Donate and Guadamillas (2011)	Spanish companies

	<ul style="list-style-type: none"> <li>• The employees demonstrate responsible behavior and a high learning disposition.</li> <li>• An effort is made to inform employees that mistakes are a learning consequence and are tolerated up to a certain limit.</li> <li>• An effort is made to encourage employees to experiment and implement new ideas in the working day.</li> <li>• Culture is based on confidence and openness.</li> <li>• All organizational members perceive the same purpose and feel bound to it.</li> </ul>		
<p>Innovativeness innovative culture</p>	<ul style="list-style-type: none"> <li>• Innovation proposals are welcomed in the organization.</li> <li>• Management promotes and supports innovative ideas, experimentation and creative processes.</li> <li>• Innovation is not perceived as too risky and is not resisted.</li> <li>• People are not penalized for new ideas that do not work.</li> <li>• Innovation is supported to cope with competition.</li> </ul>	<p>Leticia Santos-Vijande, González-Mieres &amp; Angel Lopez-Sanchez (2013).</p>	<p>Spanish KIBS</p>

	<ul style="list-style-type: none"> <li>• Management actively seeks innovative ideas.</li> </ul>		
Determinants of organizational culture that influence creativity and innovation	<ul style="list-style-type: none"> <li>• Structure</li> <li>• Conflict handling Communication</li> <li>• Freedom</li> <li>• Flexibility</li> <li>• Autonomy</li> <li>• Information technology</li> <li>• Decision making</li> <li>• Open communication</li> <li>• Cooperative teams and group interaction</li> <li>• Support mechanisms</li> <li>• Behavior that encourages innovation</li> <li>• Empowerment</li> <li>• Reward and recognition</li> <li>• Risk taking</li> <li>• Availability of resources</li> <li>• Continuous learning culture</li> <li>• Creative people</li> <li>• Mistake handling</li> <li>• Idea generating</li> </ul>	Martins and Terblanche (2003b)	Literature review

	<ul style="list-style-type: none"> <li>• Competitiveness</li> <li>• Support for change</li> <li>• Time</li> </ul>		
Culture characteristics supporting innovation	<ul style="list-style-type: none"> <li>• Learning and development</li> <li>• Market focus</li> <li>• Status differentials</li> <li>• Support and collaboration</li> <li>• Participative decision making</li> <li>• Power sharing</li> <li>• Tolerance for conflict and risk</li> <li>• Communication</li> </ul>	Hurley and Hult (1998)	Large agency of the U. S. federal government
Organizational culture as a component of Radical Product Innovation Capability	<ul style="list-style-type: none"> <li>• Customer orientation</li> <li>• Competitor orientation,</li> <li>• Technological orientation</li> <li>• Adhocracy</li> <li>• Learning orientation</li> <li>• Willingness to cannibalize</li> </ul>	Slater, Mohr and Sengupta (2014)	Conceptual framework
Organizational culture that supports innovation	<p><u>Norms for Innovation Examples:</u></p> <p>-expectations of open communication about new ideas and approaches to solving problems</p> <p>-expectations of co-operation and team work in improving new ideas and new</p>	Hogan and Coote (2014)	Law firms

	<p>methods of dealing with work tasks</p> <p>Innovative</p> <p><u>Behaviors Examples:</u></p> <ul style="list-style-type: none"> <li>-solve problems of customers in innovative ways</li> <li>-implement innovative marketing programs</li> <li>-innovate with software and technology</li> </ul> <p><u>Values Supporting Innovation</u></p> <p><u>Examples:</u></p> <ul style="list-style-type: none"> <li>-valuing open communication within the firm</li> <li>-valuing co-operation throughout the firm.</li> </ul>		
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## **APPENDIX D-1**

### **QUESTIONNAIRE ENGLISH VERSION**

Dear participant,

First of all, I would like to thank you for participating in this survey on "The Effect of Continuous Improvement Tools on Organizational Performance of the Dubai Police: The Mediating Role of Innovation Culture". This questionnaire contains six sections: Organizational Performance, 6 Sigma, Kaizen, Benchmarking, Innovation Culture, and Demographic Information.

This questionnaire is part of the requirements of the Ph.D. program in Management, Universiti of Utara Malaysia. I would like to ask you to answer the questionnaire according to your experience in this field because your opinion is very important.

This questionnaire will take approximately 5-10 minutes. Please fill in all the requirements by choosing the corresponding number for each statement as you see fit with your conviction.

Thank you and appreciates your participation in this study.

Yours faithfully,

Mohammed Saleh Alosani

Phone: 0555570401

Email: alosani@gmail.com

## Section One

In this section, we are interested in your assessment of your section's performance based on BSC. Please read the following statements and circle the number that most accurately reflects your section's performance.

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree

PF1	Resources are managed efficiently.	1	2	3	4	5
PF2	The funds that are allocated to our section are sufficient.	1	2	3	4	5
PF3	Effective financial control measures are in place.	1	2	3	4	5
PF4	The overall financial performance of our section is good.	1	2	3	4	5
PF5	Our section is always able to meet its financial goals.	1	2	3	4	5
PC6	Our section is able to meet our internal\external client demands.	1	2	3	4	5
PC7	Most of our section's clients are satisfied	1	2	3	4	5
PC8	The time taken to deliver services in our section is quite acceptable.	1	2	3	4	5
PC9	Feedback from our clients is taken seriously.	1	2	3	4	5
PC10	Our section offers quality service.	1	2	3	4	5
PC11	Delivery performance to our clients is good.	1	2	3	4	5
PP12	The number of staffs leaving our section is small.	1	2	3	4	5
PP13	Communication flows easily throughout our section.	1	2	3	4	5
PP14	Programs are implemented speedily.	1	2	3	4	5
PP15	Divisions are not overloaded with activities.	1	2	3	4	5
PP16	Our section relates well with other sections.	1	2	3	4	5
PP17	Our section implements effective strategies.	1	2	3	4	5
PP18	The level of wastage in our section is low.	1	2	3	4	5
PG19	We have the chance to participate in training and section programs.	1	2	3	4	5
PG20	Our section adopts new technology regularly.	1	2	3	4	5
PG21	Innovation is encouraged in our section.	1	2	3	4	5
PG22	There is good teamwork in our section.	1	2	3	4	5

PG23	We have ample opportunities to make independent decisions.	1	2	3	4	5
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### Section Two

In this section, we are interested in your SIX SIGMA practices in your section.

Please read the following statement and circle the number that most accurately reflects your opinion on each statement.

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree

SR1	We employ a black/green/yellow belt role structure for continuous improvement.	1	2	3	4	5
SR2	We use a black/green/yellow belt role structure to prepare and deploy individual employees for continuous improvement programs.	1	2	3	4	5
SR3	The black/green/yellow belt role structure helps our section to recognize the depth of employees' training and experience.	1	2	3	4	5
SR4	In our section, members of a quality improvement team have their roles and responsibilities specifically identified.	1	2	3	4	5
SR5	Our section uses differentiated training so that employees who have different roles in the black/green/yellow belt role structure (or equivalent structure) can obtain the necessary knowledge and skills to fulfil their job responsibilities.	1	2	3	4	5
SS6	In our section, Six Sigma projects are conducted by following a formalized procedure.	1	2	3	4	5
SS7	We use a structured approach to manage quality improvement activities.	1	2	3	4	5
SS8	We have a formal planning process to decide the major quality improvement projects.	1	2	3	4	5
SS9	We keep records about how each Six Sigma project is conducted.	1	2	3	4	5
SS10	All improvement projects are reviewed regularly during the process.	1	2	3	4	5
SS11	In our section, the service design process follows a formalized procedure.	1	2	3	4	5
SF12	Our section has a comprehensive goal-setting process for quality.	1	2	3	4	5

SF13	Quality goals are clearly communicated to employees in our section.	1	2	3	4	5
SF14	In our section, quality goals are clear and specific.	1	2	3	4	5
SF15	Our section translates customers' needs and expectation into quality goals.	1	2	3	4	5
SF16	In our section, measures for quality performance are connected with the organization's strategic quality goals.	1	2	3	4	5
SF17	Our section systematically uses a set of measures (such as defects per million opportunities, sigma level, process capability indices, defects per unit, and yield) to evaluate process improvements.	1	2	3	4	5
SU18	We understand fully ALL steps of the DMAIC methodology.	1	2	3	4	5
SU19	Our section has adapted with Six Sigma methodology.	1	2	3	4	5
SU20	We use simple tools and techniques during Six Sigma implementation.	1	2	3	4	5

### Section Three

In this section, we are interested in your KAIZEN practices in your section. Please read the following statement and circle the number that most accurately reflects your opinion on each statement.

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree

KA1	Kaizen activities increase our interest in work.	1	2	3	4	5
KA2	We like being part of continuous improvement activities.	1	2	3	4	5
KA3	Kaizen activities motivate us to perform better.	1	2	3	4	5
KA4	We would like to be a part of Kaizen activities in the future.	1	2	3	4	5
KS5	We can communicate new ideas about improvements to work area as result of our participation in kaizen activities.	1	2	3	4	5
KS6	We have gained new skills as a result of our participation in Kaizen activities.	1	2	3	4	5
KS7	We are comfortable working with others to identify improvement in this work area.	1	2	3	4	5

KU8	We understand how Kaizen can be applied in the work area.	1	2	3	4	5
KU9	We understand the objectives of implementing Kaizen.	1	2	3	4	5
KU10	We understand our role in Kaizen.	1	2	3	4	5
KU11	We understand what Kaizen is.	1	2	3	4	5
KM12	Kaizen activities have the support from senior management.	1	2	3	4	5
KM13	Management has provided enough resources for the Kaizen activities.	1	2	3	4	5
KM14	Management champions the value of Kaizen activities.	1	2	3	4	5
KM15	Management in our section allows employees in the work area to participate in Kaizen activities'.	1	2	3	4	5
KP16	In our section, the team of Kaizen regularly reviews performance data related to Kaizen goals'.	1	2	3	4	5
KP17	In our section, the team of Kaizen conducts regular audits on changes made due to the Kaizen.	1	2	3	4	5
KP18	In our section, the team of Kaizen informs higher-level management of issues with follow-up and sustaining results from the Kaizen.	1	2	3	4	5
KC19	In our section, management accepts the changes made as a result of the Kaizen	1	2	3	4	5
KC20	In our section, employees accept the changes made as a result of the Kaizen.	1	2	3	4	5
KC21	In our section, employees in the work area accepts the changes made as a result of the Kaizen.	1	2	3	4	5

#### Section Four

In this section, we are interested in your BENCHMARKING practices in your section.

Please read the following statement and circle the number that most accurately reflects your opinion on each statement.

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree

BA1	We are open to changes and other new ideas.	1	2	3	4	5
BA2	We have a comprehensive quality program (e.g. Total Quality Management).	1	2	3	4	5

BA3	We conduct internal benchmarking.	1	2	3	4	5
BA4	We truly know and understand our own operations.	1	2	3	4	5
BA5	We are aware that a portfolio of learning opportunities existed.	1	2	3	4	5
BE6	We have a dedicated project steering committee.	1	2	3	4	5
BE7	Employees fully understand the benchmarking project's objectives and benefits.	1	2	3	4	5
BE8	Employees are educated and trained in benchmarking.	1	2	3	4	5
BE9	Employees are willing to participate in the benchmarking projects.	1	2	3	4	5
BB10	We monitor competitors to find out the best pricing industry practices.	1	2	3	4	5
BB11	Benchmarking is our strategy to achieve a better competitive position.	1	2	3	4	5
BB12	In our section, we conduct research to find out the best practices of other local and international organizations.	1	2	3	4	5
BB13	It is always emphasized that benchmarking is our strategy to achieve a better competitive position.	1	2	3	4	5
BP14	We are willing to share results with our benchmarking partners.	1	2	3	4	5
BP15	There is a great understanding of benchmarking process in the section.	1	2	3	4	5
BP16	Benchmarking is formally implemented.	1	2	3	4	5
BP17	The benchmarking process is well planned.	1	2	3	4	5
BP18	The benchmarking process is completely carried out.	1	2	3	4	5

### **Section Five**

In this section, we are interested in INNOVATION CULTURE practices in your section. Please read the following statement and circle the number that most accurately reflects your opinion on each statement.

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree

IC1	When we find out something important about a customer or competitor that may affect others in the section, we know what to do with that information.	1	2	3	4	5
IC2	We have a good understanding of the value chain and vital interests concerning our section.	1	2	3	4	5
IC3	We are encouraged to flush out information on what most would consider the “not so obvious” or even obscure.	1	2	3	4	5
IC4	Knowledge generation is strategic in that we have a reliable and valid process that surveys stakeholders on a consistent basis, and that knowledge is used to direct plans.	1	2	3	4	5
IC5	We co-define value with our customers.	1	2	3	4	5
IC6	There is a consensus amongst employees about what creates value for customers/stakeholders.	1	2	3	4	5
IC7	We actively search for new ideas and investigations at all stages of service development.	1	2	3	4	5
IC8	We get the information we need to make value added decisions	1	2	3	4	5
IC9	We understand what systems/processes we must excel at to deliver customers/stakeholders value	1	2	3	4	5
IC10	Innovation in our section is more likely to succeed if employees are allowed to be unique and express this uniqueness in their daily activities.	1	2	3	4	5
IC11	We view uncertainty as opportunity and not as a risk.	1	2	3	4	5
IC12	This section uses out creativity to its benefits, that is, it uses it in a good way.	1	2	3	4	5
IC13	We are given the time/opportunity to develop our creative potential.	1	2	3	4	5
IC14	We are prepared to do things differently if given the chance to do so.	1	2	3	4	5
IC15	Innovation is an underlying culture and not just a word.	1	2	3	4	5
IC16	Our business model is premised on the basis of strategic intent.	1	2	3	4	5
IC17	Our senior managers are able to effectively cascade the innovation message throughout the organization.	1	2	3	4	5
IC18	We have an innovation vision that is aligned with projects, platforms, or initiatives.	1	2	3	4	5
IC19	This management team is diverse in their thinking in that they have different views as to how things should be done.	1	2	3	4	5
IC20	There is a coherent set of innovation goals and objectives that have been articulated.	1	2	3	4	5
IC21	Innovation is a core value in this section.	1	2	3	4	5

**Section Six**

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Sex:	Male <input type="checkbox"/>	Female <input type="checkbox"/>		
Qualification:	Under High School <input type="checkbox"/>	High School <input type="checkbox"/>		
	College Degree <input type="checkbox"/>	Graduate Studies (Master/PhD) <input type="checkbox"/>		
Experiences:	0-5 Years <input type="checkbox"/>	6-10 Years <input type="checkbox"/>	More Than 10 Years <input type="checkbox"/>	
Did you get training in	Six Sigma	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
	Kaizen	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
	Benchmarking	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
Department's name:				

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## APPENDIX D-2 QUESTIONNAIRE ARABIC VERSION

عزيزي المشارك،،،

بداية نشكرك على المشاركة في هذه الدراسة الاستقصائية عن " تأثير أدوات التحسين المستمر والثقافة الابتكارية على الأداء في شرطة دبي". يحتوي هذا الاستبيان على ستة أقسام وهي الأداء التنظيمي، 6 سيجماء، كايزن، المقارنة المرجعية، وثقافة الابتكار بالإضافة الى المعلومات الديموغرافية. هذا الاستبيان جزء من متطلبات برنامج الدكتوراه، في الإدارة، جامعة اوتارا ماليزيا. أرجو تفضلكم بالإجابة على الاستبيان وفقاً لخبرتكم في هذا المجال كون رأيكم مهم للغاية. يأخذ الاستبيان من وقتكم الثمين 5-10 دقائق تقريباً. يرجى التكرم بتعبئة جميع المتطلبات، من خلال اختيار الرقم المقابل لكل عبارة حسب ما ترونه متفقاً مع قناعتكم.



شاكراً ومقدراً مشاركتكم في هذه الدراسة البحثية وتفضلوا بقبول فائق التقدير والاحترام

محمد صالح العوساني  
Universiti Utara Malaysia

هاتف رقم: 0555570401

طالب دكتوراه في الادارة

بريد الكتروني: alosani@gmail.com

جامعة اوتارا ماليزيا

## القسم الأول

في هذا القسم من الاستبيان نرغب في معرفة رأيك حول أداء وحدتك التنظيمية. الرجاء قراءة العبارات التالية ووضع دائرة حول الرقم الذي يعكس تقييمك لكل عبارة.

5	4	3	2	1
موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة

5	4	3	2	1	
					PF1 يتم إدارة الموارد (البشرية، المادية، المالية) بكفاءة عالية.
					PF2 الميزانية المخصصة لوحدتنا التنظيمية كافية.
					PF3 توجد مؤشرات فعالة لقياس الرقابة المالية.
					PF4 بشكل عام الأداء المالي لوحدتنا التنظيمية جيد.
					PF5 وحدتنا التنظيمية قادرة دائماً على تحقيق أهدافها المالية (مثل: الالتزام ببندود الميزانية، تحقيق وفر مالي، خفض التكاليف... الخ)
					PC6 وحدتنا التنظيمية قادرة على تلبية متطلبات المتعاملين (الداخليين او الخارجيين).
					PC7 معظم المتعاملين ( الداخليين او الخارجيين) عن وحدتنا التنظيمية راضون.
					PC8 الوقت المستغرق لتقديم الخدمات للمتعاملين ( الداخليين او الخارجيين) في وحدتنا التنظيمية جيد.
					PC9 التغذية الراجعة من متعاملينا ( الداخليين او الخارجيين) يتم التعامل معها بجدية.
					PC10 تقدم وحدتنا التنظيمية خدمات ذات جودة عالية.
					PC11 أداء الخدمات المقدمة لمتعاملينا (الداخليين او الخارجيين) جيدة.
					PP12 عدد الموظفين الذين يتركون وحدتنا التنظيمية قليل.
					PP13 الاتصالات والتواصل في جميع أنحاء وحدتنا التنظيمية تحدث بسلاسة.
					PP14 يتم تنفيذ البرامج والمشاريع والمبادرات بسرعة.
					PP15 الشعب الإدارية في وحدتنا التنظيمية غير مثقلة بالأنشطة.
					PP16 وحدتنا التنظيمية ترتبط بشكل جيد مع الوحدات التنظيمية الأخرى.
					PP17 وحدتنا التنظيمية تنفذ استراتيجيات فعالة.
					PP18 مستوى الفاقد (مثل الوقت، الموارد، الجهد...) في وحدتنا التنظيمية منخفض.
					PG19 لدينا فرصة للمشاركة في أنشطة التدريب المختلفة.
					PG20 تتبنى وحدتنا التنظيمية التكنولوجيا الجديدة بشكل دائم.
					PG21 تشجع وحدتنا التنظيمية على الابتكار.
					PG22 هناك فرق عمل جيدة في وحدتنا التنظيمية.
					PG23 لدينا الكثير من الفرص لاتخاذ قرارات مستقلة.

## القسم الثاني

في هذا الجزء من الاستبيان نرغب في معرفة رأيك حول ممارسات 6 سيجما في وحدتك التنظيمية. الرجاء قراءة العبارات التالية ووضع دائرة حول الرقم الذي يعكس تقييمك لكل عبارة.

5	4	3	2	1
موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة

5	4	3	2	1	SR1	نطبق نظام الأزممة (السوداء، الخضراء، الصفراء) في عملية التحسين المستمر.
5	4	3	2	1	SR2	نستخدم نظام الأزممة (السوداء، الخضراء، الصفراء) لتجهيز وإعداد الموظفين لتنفيذ برامج التحسين المستمر.
5	4	3	2	1	SR3	نظام الأزممة (السوداء، الخضراء، الصفراء) يساعد وحدتنا التنظيمية للتعرف بعمق على مستوى التدريب والخبرة لدى الموظفين.
5	4	3	2	1	SR4	هناك أدوار ومسؤوليات محددة بوضوح لأعضاء فريق التحسين في وحدتنا التنظيمية.
5	4	3	2	1	SR5	تنفذ وحدتنا التنظيمية تدريباً متميزاً بغرض تمكين الموظفين الذين لديهم أدوار مختلفة في نظام الأزممة (السوداء، الخضراء، الصفراء) للحصول على المعرفة والمهارات اللازمة للقيام بمسؤولياتهم الوظيفية.
5	4	3	2	1	SS6	في وحدتنا التنظيمية، يتم تنفيذ مشاريع 6 سيجما من خلال اتباع إجراءات معتمدة وواضحة.
5	4	3	2	1	SS7	نحن نستخدم منهج منظم لإدارة أنشطة تحسين الجودة.
5	4	3	2	1	SS8	لدينا عملية تخطيط معتمدة لتحديد مشاريع التحسين.
5	4	3	2	1	SS9	يتم الاحتفاظ بسجلات موثقة عن مشاريع 6 سيجما المنفذة.
5	4	3	2	1	SS10	تتم مراجعة جميع مشاريع التحسين بانتظام خلال عملية التحسين.
5	4	3	2	1	SS11	عملية تصميم الخدمة في وحدتنا التنظيمية تتبع إجراءات رسمية موثقة ومعتمدة.
5	4	3	2	1	SF12	لدينا منهج لكيفية تحديد أهداف العمليات للوصول إلى الجودة المطلوبة.
5	4	3	2	1	SF13	يتم توعية وإيصال أهداف الجودة الموضوعة بوضوح للموظفين في وحدتنا التنظيمية.
5	4	3	2	1	SF14	أهداف الجودة في وحدتنا التنظيمية واضحة ومحددة.
5	4	3	2	1	SF15	يتم استيعاب احتياجات المتعاملين وتوقعاتهم في أهداف الجودة.
5	4	3	2	1	SF16	ترتبط مؤشرات جودة الأداء في وحدتنا التنظيمية بالأهداف الاستراتيجية للجودة للمؤسسة.
5	4	3	2	1	SF17	تستخدم وحدتنا التنظيمية بشكل منهجي مجموعة من المقاييس (مثل العيوب لكل مليون فرصة، ومستوى سيجما، ومؤشرات قدرة العمليات، وعيوب كل وحدة...) لتقييم عملية التحسين.
5	4	3	2	1	SU18	لدينا معرفة تامة بجميع خطوات منهجية DMAIC
5	4	3	2	1	SU19	وحدتنا التنظيمية تكيفت تماماً مع منهجية 6 سيجما.
5	4	3	2	1	SU20	نستخدم أدوات وتقنيات سهلة وخالية من التعقيد أثناء تنفيذ مشاريع 6 سيجما

### القسم الثالث

في هذا القسم من الاستبيان نرغب في معرفة رأيك ممارسات كايزن في وحدتك التنظيمية. الرجاء قراءة العبارات التالية ووضع دائرة حول الرقم الذي يعكس تقييمك لكل عبارة.

5	4	3	2	1
موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة

5	4	3	2	1	أنشطة كايزن ترفع من مستوى اهتمامنا بالعمل.	KA1
5	4	3	2	1	لدينا الرغبة في أن نكون جزءًا من أنشطة التحسين المستمر.	KA2
5	4	3	2	1	أنشطة كايزن تساعدنا لتقديم أداء أفضل.	KA3
5	4	3	2	1	نرغب في المشاركة بأنشطة كايزن في المستقبل.	KA4
5	4	3	2	1	يمكننا توصيل أفكار جديدة حول التحسينات في مجال العمل كنتيجة لمشاركتنا في أنشطة كايزن.	KS5
5	4	3	2	1	لقد اكتسبنا مهارات جديدة كنتيجة لمشاركتنا في أنشطة كايزن.	KS6
5	4	3	2	1	نشعر بالارتياح للعمل مع الآخرين لتحديد مجالات التحسين في وحدتنا التنظيمية.	KS7
5	4	3	2	1	لدينا الفهم بكيفية تطبيق مشاريع كايزن في مجال العمل.	KU8
5	4	3	2	1	ندرك تماما الهدف من تنفيذ مشاريع كايزن.	KU9
5	4	3	2	1	لدينا الوعي الكافي بأهمية دورنا في مشاريع كايزن.	KU10
5	4	3	2	1	لدينا الوعي بمنهجية كايزن ودورها في عملية التحسين.	KU11
5	4	3	2	1	تحظى مشاريع كايزن بدعم الإدارة العليا.	KM12
5	4	3	2	1	توفر الإدارة الموارد الكافية لتنفيذ مشاريع كايزن.	KM13
5	4	3	2	1	تعترف الإدارة بأهمية وقيمة مشاريع كايزن في عملية التحسين.	KM14
5	4	3	2	1	تسمح الإدارة في وحدتنا التنظيمية للموظفين المعنيين بعملية التحسين بالمشاركة في مشاريع كايزن .	KM15
5	4	3	2	1	يقوم فريق كايزن في وحدتنا التنظيمية بمراجعة بيانات الأداء المتعلقة بأهداف كايزن بانتظام.	KP16
5	4	3	2	1	يقوم فريق كايزن في وحدتنا التنظيمية بإجراء عملية تدقيق منتظمة على التغييرات التي تمت نتيجة تطبيق مشاريع كايزن.	KP17
5	4	3	2	1	يقوم فريق كايزن في وحدتنا التنظيمية بإبلاغ الإدارة العليا بالمشاكل المتعلقة بإجراءات المتابعة والحفاظ على النتائج المتحققة من مشاريع كايزن.	KP18
5	4	3	2	1	في وحدتنا التنظيمية، نتقبل (الإدارة) التغييرات التي تم إجراؤها نتيجة لتنفيذ مشاريع كايزن.	KC19
5	4	3	2	1	في وحدتنا التنظيمية، يتقبل (الموظفين) التغييرات التي تم إجراؤها نتيجة لتنفيذ مشاريع كايزن.	KC20
5	4	3	2	1	في وحدتنا التنظيمية، يتقبل الموظفون (المعنيين في منطقة التحسين) التغييرات التي تم إجراؤها نتيجة لتنفيذ مشاريع كايزن.	KC21

### القسم الرابع

في هذا القسم من الاستبيان نرغب في معرفة رأيك ممارسات المقارنات المرجعية في وحدتك التنظيمية. الرجاء قراءة العبارات التالية ووضع دائرة حول الرقم الذي يعكس تقييمك لكل عبارة.

5	4	3	2	1
موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة

5	4	3	2	1	BA1	وحدتنا التنظيمية منفتحة وتتقبل التغييرات والأفكار الجديدة.
5	4	3	2	1	BA2	لدينا برنامج لتطوير الجودة (على سبيل المثال، إدارة الجودة الشاملة).
5	4	3	2	1	BA3	أجرينا العديد من المقارنات المرجعية الداخلية.
5	4	3	2	1	BA4	لدينا المعرفة والفهم الكافي بعملياتنا الإدارية.
5	4	3	2	1	BA5	ندرك وجود مجموعة من فرص التعلم من خلال المقارنة المرجعية.
5	4	3	2	1	BE6	لدينا لجنة مختصة بالإشراف على مشاريع المقارنات المرجعية.
5	4	3	2	1	BE7	لدى الموظفين المعرفة الكافية بأهداف ومزايا المقارنة المرجعية.
5	4	3	2	1	BE8	يتم تعليم وتدريب الموظفين على المقارنة المرجعية.
5	4	3	2	1	BE9	لدى الموظفين الرغبة في المشاركة في مشاريع المقارنات المرجعية.
5	4	3	2	1	BB10	يتم متابعة المنافسين بهدف الحصول على أفضل الممارسات في مجال العمل.
5	4	3	2	1	BB11	المقارنة المرجعية هي استراتيجيتنا للحصول على أفضل موقع ريادي.
5	4	3	2	1	BB12	في وحدتنا التنظيمية يتم إجراء البحث لايجاد أفضل الممارسات المحلية والعالمية.
5	4	3	2	1	BB13	مؤسستنا تؤكد بشكل دائم على ان المقارنة المرجعية هي الاستراتيجية لتحقيق افضل موقع ريادي.
5	4	3	2	1	BP14	ليس لدينا مانع في مشاركة نتائجنا مع شركاؤنا.
5	4	3	2	1	BP15	هناك فهم كافي لعملية المقارنة المرجعية في وحدتنا التنظيمية.
5	4	3	2	1	BP16	يتم تطبيق المقارنة المرجعية بشكل رسمي ومعتمد.
5	4	3	2	1	BP17	عملية المقارنة المرجعية يتم التخطيط لها بشكل جيد.
5	4	3	2	1	BP18	يتم تنفيذ عملية المقارنة المرجعية بشكل كامل في وحدتنا التنظيمية.

### القسم الخامس

في هذا القسم من الاستبيان نرغب في معرفة رأيك حول الثقافة الابتكارية في وحدتك التنظيمية. الرجاء قراءة العبارات التالية ووضع دائرة حول الرقم الذي يعكس تقييمك لكل عبارة.

5	4	3	2	1
موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة

5	4	3	2	1	IC1	عندما يتم اكتشاف شيئاً مهماً يتعلق بعمل أو منافس معين، والذي ربما قد يؤثر على وحدتنا التنظيمية، فإننا نعرف ما يجب ان نقوم به تجاه تلك المعلومات.
5	4	3	2	1	IC2	لدينا فهم جيد بالاهتمامات الرئيسية والحيوية المتعلقة بوجدتنا التنظيمية.
5	4	3	2	1	IC3	نشجع على البحث عن المعلومات المتعلقة بالمواضيع غير الواضحة او الغامضة في مجال العمل.
5	4	3	2	1	IC4	توليد المعرفة أمر استراتيجي في وحدتنا الإدارية من حيث أن لدينا عملية موثقة وصحيحة تقوم باستطلاع رأي أصحاب المصلحة على أساس ثابت، وأن تلك المعرفة تستخدم لتوجيه الخطط.
5	4	3	2	1	IC5	نحن نشرك عملائنا في تعريف القيمة المضافة.
5	4	3	2	1	IC6	هناك إجماع بين الموظفين حول ما يخلق القيمة المضافة للمتعاملين/ أصحاب المصلحة.
5	4	3	2	1	IC7	نحن نبحث بجدية عن أفكار وتحقيقات جديدة في جميع مراحل تطوير الخدمات.
5	4	3	2	1	IC8	نحصل على المعلومات التي نحتاجها لاتخاذ قرارات ذات قيمة مضافة
5	4	3	2	1	IC9	لدينا الفهم بماهية الأنظمة/العمليات التي يجب علينا التفوق فيها لتقديم قيمة مضافة للمتعاملين/أصحاب المصلحة.
5	4	3	2	1	IC10	من المرجح أن ينجح الابتكار في قسمنا إذا سمح للموظفين بأن يكونوا متميزين وأن يعبروا عن تميزهم من خلال أنشطتهم اليومية.
5	4	3	2	1	IC11	نحن نعتبر عدم التأكد فرصة وليس خطراً.
5	4	3	2	1	IC12	توظف وحدتنا الإدارية الابتكار لتحقيق اهدافها، أي أنها توظف هذا الابتكار بطريقة جيدة.
5	4	3	2	1	IC13	يتم منحنا الوقت/الفرصة لتطوير إمكاناتنا الإبداعية.
5	4	3	2	1	IC14	نحن مستعدون للقيام بأعمالنا بشكل مختلف إذا أتيحت لنا الفرصة للقيام بذلك.
5	4	3	2	1	IC15	الابتكار هو ثقافة كامنة وليس مجرد كلمة.
5	4	3	2	1	IC16	نموذج الاعمال لدينا يركز على اهداف استراتيجية واضحة.
5	4	3	2	1	IC17	مدراؤنا قادرون على توصيل ونشر رسالة الابتكار في المؤسسة.
5	4	3	2	1	IC18	لدينا رؤية ابتكارية تتماشى مع المشاريع والبرامج والمبادرات.
5	4	3	2	1	IC19	يتنوع فريق إدارة هذه المؤسسة في تفكيرهم في أن لديهم وجهات نظر مختلفة حول كيفية القيام بالاعمال.
5	4	3	2	1	IC20	هناك ترابط بين الغاية من الابتكار والاهداف الاستراتيجية للمؤسسة.
5	4	3	2	1	IC21	وحدتنا الإدارية تعتبر الابتكار مصدر قيم و اساسي يتم الارتكاز عليه.

القسم السادس

<input type="checkbox"/> ذكر		<input type="checkbox"/> انثى	الجنس:
<input type="checkbox"/> ثانوية عامة		<input type="checkbox"/> ثانوية عليا	المؤهل العلمي:
<input type="checkbox"/> جامعي		<input type="checkbox"/> دراسات عليا	
<input type="checkbox"/> 0-5 سنوات		<input type="checkbox"/> 6-10 سنوات	الخبرة:
هل حصلت على تدريب في:		سنة سيجما	
<input type="checkbox"/> لا		<input type="checkbox"/> نعم	
كايزن		<input type="checkbox"/> نعم	
المقارنات المرجعية		<input type="checkbox"/> نعم	
<input type="checkbox"/> لا		<input type="checkbox"/> نعم	
<input type="checkbox"/> لا		<input type="checkbox"/> نعم	
			اسم الإدارة:



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**APPENDIX E**  
**TEST OF NON-RESPONDENT BIAS**

**Group Statistics**

Bias		N	Mean	Std. Deviation	Std. Error Mean
Organizational Performance	Early	221	3.9821	0.55635	0.03742
	Late	31	3.9480	0.78200	0.14045
Six Sigma	Early	221	4.0582	0.59153	0.03979
	Late	31	3.9081	0.85558	0.15367
Kaizen	Early	221	3.8458	0.64165	0.04316
	Late	31	3.9263	0.67409	0.12107
Benchmarking	Early	221	4.1999	0.61584	0.04143
	Late	31	4.0484	0.91070	0.16357
Innovation Culture	Early	221	4.0985	0.61859	0.04161
	Late	31	3.9908	0.81236	0.14590

## Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Organizational Performance	Equal variances assumed	1.101	0.295	-0.671	243	0.503	-0.07437	0.11087	-0.29276	0.14403
	Equal variances not assumed			-0.606	34.025	0.548	-0.07437	0.12265	-0.32361	0.17487
Six Sigma	Equal variances assumed	5.298	0.022	0.446	243	0.656	0.05215	0.11700	-0.17832	0.28262
	Equal variances not assumed			0.360	32.418	0.721	0.05215	0.14490	-0.24285	0.34715
Kaizen	Equal variances assumed	0.039	0.844	-0.638	243	0.524	-0.08001	0.12544	-0.32710	0.16708
	Equal variances not assumed			-0.618	35.287	0.540	-0.08001	0.12943	-0.34269	0.18267
Benchmarking	Equal variances assumed	1.691	0.195	0.738	243	0.461	0.08744	0.11848	-0.14594	0.32082

	Equal variances not assumed			0.601	32.521	0.552	0.08744	0.14552	-0.20878	0.38366
Innovation Culture	Equal variances assumed	0.617	0.433	0.231	243	0.817	0.02677	0.11578	-0.20128	0.25482
	Equal variances not assumed			0.209	34.052	0.835	0.02677	0.12787	-0.23307	0.28661



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**APPENDIX F**  
**CASE PROCESSING SUMMARY (MISSING VALUES) (BEFORE**  
**REPLACED)**

Item	Missing		Item	Missing		Item	Missing	
	N	Percent		N	Percent		N	Percent
PF1	0	0.0%	SF13	1	0.4%	BE7	1	0.4%
PF2	0	0.0%	SF14	2	0.8%	BE8	0	0.0%
PF3	0	0.0%	SF15	2	0.8%	BE9	2	0.8%
PF4	2	0.8%	SF16	3	1.2%	BB10	2	0.8%
PF5	1	0.4%	SF17	4	1.6%	BB11	0	0.0%
PC6	1	0.4%	SU18	7	2.8%	BB12	1	0.4%
PC7	3	1.2%	SU19	6	2.4%	BB13	2	0.8%
PC8	3	1.2%	SU20	5	2.0%	BP14	8	3.2%
PC9	2	0.8%	KA1	6	2.4%	BP15	1	0.4%
PC10	0	0.0%	KA2	3	1.2%	BP16	1	0.4%
PC11	4	1.6%	KA3	5	2.0%	BP17	0	0.0%
PP12	4	1.6%	KA4	5	2.0%	BP18	1	0.4%
PP13	0	0.0%	KS5	7	2.8%	IC1	1	0.4%
PP14	1	0.4%	KS6	7	2.8%	IC2	1	0.4%
PP15	4	1.6%	KS7	7	2.8%	IC3	4	1.6%
PP16	5	2.0%	KU8	6	2.4%	IC4	1	0.4%
PP17	0	0.0%	KU9	14	5.6%	IC5	3	1.2%
PP18	2	0.8%	KU10	8	3.2%	IC6	2	0.8%
PG19	2	0.8%	KU11	7	2.8%	IC7	2	0.8%
PG20	3	1.2%	KM12	6	2.4%	IC8	4	1.6%
PG21	2	0.8%	KM13	9	3.6%	IC9	4	1.6%
PG22	0	0.0%	KM14	6	2.4%	IC10	1	0.4%
PG23	0	0.0%	KM15	6	2.4%	IC11	5	2.0%
SR1	5	2.0%	KP16	9	3.6%	IC12	4	1.6%

SR2	5	2.0%	KP17	9	3.6%	IC13	3	1.2%
SR3	4	1.6%	KP18	8	3.2%	IC14	2	0.8%
SR4	2	0.8%	KC19	7	2.8%	IC15	3	1.2%
SR5	4	1.6%	KC20	7	2.8%	IC16	2	0.8%
SS6	5	2.0%	KC21	6	2.4%	IC17	2	0.8%
SS7	2	0.8%	BA1	0	0.0%	IC18	3	1.2%
SS8	1	0.4%	BA2	0	0.0%	IC19	3	1.2%
SS9	6	2.4%	BA3	2	0.8%	IC20	3	1.2%
SS10	3	1.2%	BA4	0	0.0%	IC21	4	1.6%
SS11	2	0.8%	BA5	0	0.0%			
SF12	6	2.4%	BE6	0	0.0%			



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**APPENDIX G**  
**REMOVING OUTLIERS (MAHALANOBIS)**

Respondent	MAH 1	Probability MD	Outlier	Respondant	MAH 1	Probability MD	Outlier
1	7.11	0.13	0.00	127	0.32	0.99	0.00
2	2.11	0.72	0.00	128	0.30	0.99	0.00
3	0.32	0.99	0.00	129	0.32	0.99	0.00
4	3.61	0.46	0.00	130	13.76	0.01	0.00
5	3.06	0.55	0.00	131	1.35	0.85	0.00
6	1.85	0.76	0.00	132	1.90	0.75	0.00
7	2.77	0.60	0.00	133	0.84	0.93	0.00
8	3.33	0.50	0.00	134	1.60	0.81	0.00
9	1.62	0.81	0.00	135	3.38	0.50	0.00
10	1.35	0.85	0.00	136	4.10	0.39	0.00
11	1.96	0.74	0.00	137	12.86	0.01	0.00
12	2.94	0.57	0.00	138	3.41	0.49	0.00
13	2.94	0.57	0.00	139	3.41	0.49	0.00
14	1.26	0.87	0.00	140	3.03	0.55	0.00
15	2.94	0.57	0.00	141	1.56	0.82	0.00
16	0.93	0.92	0.00	142	9.04	0.06	0.00
17	0.32	0.99	0.00	143	10.27	0.04	0.00
18	6.28	0.18	0.00	144	4.70	0.32	0.00
19	3.52	0.48	0.00	145	3.41	0.49	0.00
20	4.08	0.40	0.00	146	3.33	0.50	0.00
21	0.41	0.98	0.00	147	1.33	0.86	0.00
22	5.48	0.24	0.00	148	1.04	0.90	0.00
23	0.32	0.99	0.00	<b>149</b>	<b>52.75</b>	<b>0.00</b>	<b>1.00</b>
24	2.21	0.70	0.00	150	1.44	0.84	0.00
25	3.67	0.45	0.00	151	2.83	0.59	0.00
26	3.67	0.45	0.00	152	3.28	0.51	0.00
27	3.67	0.45	0.00	153	2.25	0.69	0.00
28	1.07	0.90	0.00	154	2.55	0.64	0.00
29	4.30	0.37	0.00	155	0.51	0.97	0.00
30	4.74	0.32	0.00	156	0.32	0.99	0.00
31	0.56	0.97	0.00	157	2.35	0.67	0.00
32	1.49	0.83	0.00	158	2.95	0.57	0.00
33	0.40	0.98	0.00	159	2.83	0.59	0.00
34	2.84	0.58	0.00	<b>160</b>	<b>20.44</b>	<b>0.00</b>	<b>1.00</b>
35	0.37	0.99	0.00	161	2.24	0.69	0.00
36	4.35	0.36	0.00	162	3.41	0.49	0.00
37	3.15	0.53	0.00	163	0.67	0.95	0.00
38	1.91	0.75	0.00	164	2.83	0.59	0.00

39	9.44	0.05	0.00	165	6.39	0.17	0.00
40	13.68	0.01	0.00	166	7.95	0.09	0.00
41	1.35	0.85	0.00	167	5.27	0.26	0.00
42	2.01	0.73	0.00	168	4.47	0.35	0.00
43	6.26	0.18	0.00	169	0.32	0.99	0.00
44	6.34	0.18	0.00	170	2.36	0.67	0.00
45	0.43	0.98	0.00	171	1.82	0.77	0.00
46	1.66	0.80	0.00	172	1.69	0.79	0.00
47	3.95	0.41	0.00	173	3.68	0.45	0.00
48	1.28	0.87	0.00	174	8.90	0.06	0.00
49	0.90	0.92	0.00	175	6.86	0.14	0.00
50	3.58	0.47	0.00	<b>176</b>	<b>30.92</b>	<b>0.00</b>	<b>1.00</b>
51	2.69	0.61	0.00	177	3.25	0.52	0.00
52	2.74	0.60	0.00	178	0.82	0.94	0.00
53	1.16	0.88	0.00	179	6.28	0.18	0.00
54	3.41	0.49	0.00	180	2.31	0.68	0.00
55	1.22	0.87	0.00	181	0.32	0.99	0.00
56	4.48	0.35	0.00	<b>182</b>	<b>22.18</b>	<b>0.00</b>	<b>1.00</b>
57	0.33	0.99	0.00	183	1.69	0.79	0.00
58	4.63	0.33	0.00	184	1.59	0.81	0.00
59	3.12	0.54	0.00	<b>185</b>	<b>24.69</b>	<b>0.00</b>	<b>1.00</b>
60	0.19	1.00	0.00	186	6.93	0.14	0.00
61	2.31	0.68	0.00	187	3.17	0.53	0.00
62	9.78	0.04	0.00	188	4.89	0.30	0.00
63	5.12	0.28	0.00	189	6.01	0.20	0.00
64	0.32	0.99	0.00	190	3.29	0.51	0.00
65	2.89	0.58	0.00	191	4.34	0.36	0.00
66	3.14	0.53	0.00	192	14.14	0.01	0.00
67	5.16	0.27	0.00	193	4.39	0.36	0.00
68	4.27	0.37	0.00	194	3.29	0.51	0.00
69	9.55	0.05	0.00	195	2.64	0.62	0.00
70	1.35	0.85	0.00	196	13.29	0.01	0.00
71	10.95	0.03	0.00	197	3.41	0.49	0.00
72	3.63	0.46	0.00	198	6.10	0.19	0.00
73	0.33	0.99	0.00	199	5.31	0.26	0.00
74	4.69	0.32	0.00	200	2.08	0.72	0.00
75	0.47	0.98	0.00	201	4.22	0.38	0.00
76	1.03	0.90	0.00	202	0.68	0.95	0.00
77	1.72	0.79	0.00	203	1.30	0.86	0.00
78	5.61	0.23	0.00	204	4.04	0.40	0.00
79	2.91	0.57	0.00	205	0.99	0.91	0.00
80	2.98	0.56	0.00	206	0.47	0.98	0.00
81	4.20	0.38	0.00	207	0.82	0.94	0.00
82	2.51	0.64	0.00	208	4.73	0.32	0.00
83	10.60	0.03	0.00	209	1.30	0.86	0.00

84	4.54	0.34	0.00	210	1.61	0.81	0.00
85	6.41	0.17	0.00	211	1.41	0.84	0.00
86	1.61	0.81	0.00	212	0.81	0.94	0.00
87	0.73	0.95	0.00	213	1.01	0.91	0.00
88	1.14	0.89	0.00	214	1.71	0.79	0.00
89	2.23	0.69	0.00	215	4.29	0.37	0.00
90	4.90	0.30	0.00	216	1.82	0.77	0.00
91	1.64	0.80	0.00	217	4.98	0.29	0.00
92	0.55	0.97	0.00	218	3.97	0.41	0.00
93	14.42	0.01	0.00	219	9.81	0.04	0.00
94	0.32	0.99	0.00	220	0.33	0.99	0.00
95	0.32	0.99	0.00	221	0.42	0.98	0.00
96	0.32	0.99	0.00	222	0.11	1.00	0.00
97	0.66	0.96	0.00	223	2.80	0.59	0.00
98	1.06	0.90	0.00	224	7.64	0.11	0.00
99	6.89	0.14	0.00	225	1.06	0.90	0.00
100	1.96	0.74	0.00	226	0.39	0.98	0.00
101	10.85	0.03	0.00	<b>227</b>	<b>26.03</b>	<b>0.00</b>	<b>1.00</b>
102	4.36	0.36	0.00	228	3.66	0.45	0.00
103	3.60	0.46	0.00	229	2.83	0.59	0.00
104	2.11	0.72	0.00	230	3.52	0.48	0.00
105	0.96	0.92	0.00	231	2.98	0.56	0.00
106	5.23	0.26	0.00	232	0.29	0.99	0.00
107	0.24	0.99	0.00	233	1.72	0.79	0.00
108	0.32	0.99	0.00	234	3.41	0.49	0.00
109	0.93	0.92	0.00	235	0.52	0.97	0.00
110	2.17	0.70	0.00	236	5.99	0.20	0.00
111	0.46	0.98	0.00	237	2.44	0.66	0.00
112	1.67	0.80	0.00	238	5.05	0.28	0.00
113	4.29	0.37	0.00	239	3.32	0.51	0.00
114	0.32	0.99	0.00	240	3.30	0.51	0.00
115	6.40	0.17	0.00	241	1.85	0.76	0.00
116	0.73	0.95	0.00	242	2.34	0.67	0.00
117	0.84	0.93	0.00	<b>243</b>	<b>30.08</b>	<b>0.00</b>	<b>1.00</b>
118	2.05	0.73	0.00	244	2.43	0.66	0.00
119	0.39	0.98	0.00	245	3.33	0.50	0.00
120	3.02	0.55	0.00	246	18.31	0.00	0.00
121	3.41	0.49	0.00	247	0.52	0.97	0.00
122	3.24	0.52	0.00	248	3.35	0.50	0.00
123	3.03	0.55	0.00	249	0.32	0.99	0.00
124	4.02	0.40	0.00	250	1.33	0.86	0.00
125	3.36	0.50	0.00	251	2.12	0.71	0.00
126	2.35	0.67	0.00	252	4.84	0.30	0.00

**APPENDIX H**  
**LOADINGS AND CROSS LOADINGS (BEFORE DELETION)**  
**(ORIGINAL MODEL)**

	Benchmarking	Innovation Culture	Kaizen	Organizational Performance	Six Sigma
BA1	0.754	0.701	0.456	0.609	0.594
BA2	0.728	0.650	0.411	0.507	0.556
BA3	0.766	0.657	0.451	0.541	0.589
BA4	0.757	0.680	0.483	0.588	0.604
BA5	0.809	0.660	0.490	0.557	0.628
BB10	0.839	0.693	0.504	0.587	0.645
BB11	0.756	0.633	0.476	0.480	0.549
BB12	0.837	0.716	0.552	0.601	0.669
BB13	0.839	0.698	0.533	0.569	0.625
BE6	0.749	0.598	0.498	0.462	0.600
BE7	0.804	0.644	0.527	0.539	0.624
BE8	0.753	0.598	0.552	0.556	0.651
BE9	0.768	0.648	0.569	0.543	0.611
BP14	0.718	0.666	0.436	0.554	0.544
BP15	0.818	0.658	0.504	0.569	0.628
BP16	0.819	0.649	0.485	0.574	0.631
BP17	0.825	0.677	0.531	0.632	0.636
BP18	0.766	0.667	0.526	0.626	0.638
IC1	0.656	0.752	0.481	0.575	0.539
IC10	0.629	0.738	0.481	0.547	0.537
IC11	0.493	0.579	0.434	0.445	0.456
IC12	0.662	0.781	0.494	0.592	0.625
IC13	0.567	0.737	0.456	0.592	0.567

IC14	0.637	0.775	0.475	0.559	0.511
IC15	0.591	0.739	0.432	0.517	0.494
IC16	0.731	0.839	0.529	0.643	0.613
IC17	0.638	0.753	0.506	0.587	0.566
IC18	0.666	0.803	0.544	0.610	0.642
IC19	0.628	0.772	0.508	0.555	0.629
IC2	0.736	0.811	0.539	0.625	0.626
IC20	0.630	0.763	0.502	0.605	0.597
IC21	0.688	0.781	0.546	0.584	0.599
IC3	0.652	0.753	0.425	0.507	0.506
IC4	0.717	0.826	0.531	0.615	0.650
IC5	0.638	0.765	0.527	0.595	0.562
IC6	0.608	0.740	0.567	0.532	0.549
IC7	0.705	0.807	0.497	0.569	0.605
IC8	0.633	0.788	0.569	0.607	0.627
IC9	0.634	0.754	0.587	0.629	0.614
KA1	0.560	0.561	0.748	0.507	0.575
KA2	0.520	0.497	0.628	0.394	0.524
KA3	0.569	0.576	0.750	0.495	0.572
KA4	0.504	0.494	0.638	0.392	0.540
KC19	0.492	0.539	0.828	0.570	0.618
KC20	0.525	0.546	0.828	0.586	0.645
KC21	0.457	0.553	0.829	0.568	0.612
KM12	0.494	0.538	0.815	0.509	0.580
KM13	0.437	0.512	0.816	0.506	0.595
KM14	0.464	0.513	0.821	0.500	0.563
KM15	0.476	0.506	0.837	0.529	0.598
KP16	0.449	0.448	0.823	0.530	0.574
KP17	0.451	0.463	0.814	0.498	0.577
KP18	0.548	0.558	0.843	0.580	0.621

KS5	0.583	0.594	0.723	0.466	0.639
KS6	0.444	0.469	0.757	0.433	0.592
KS7	0.510	0.547	0.656	0.523	0.634
KU10	0.430	0.410	0.750	0.460	0.531
KU11	0.458	0.442	0.759	0.506	0.563
KU8	0.459	0.486	0.786	0.494	0.596
KU9	0.476	0.432	0.748	0.440	0.554
PC10	0.590	0.652	0.505	0.753	0.626
PC11	0.568	0.641	0.500	0.790	0.583
PC6	0.477	0.525	0.421	0.724	0.485
PC7	0.465	0.485	0.447	0.698	0.470
PC8	0.460	0.515	0.476	0.738	0.507
PC9	0.560	0.644	0.455	0.714	0.559
PF1	0.477	0.475	0.417	0.658	0.487
PF2	0.359	0.361	0.415	0.644	0.427
PF3	0.481	0.487	0.503	0.686	0.512
PF4	0.473	0.468	0.453	0.709	0.475
PF5	0.470	0.457	0.414	0.723	0.516
PG19	0.550	0.544	0.477	0.699	0.613
PG20	0.443	0.467	0.468	0.661	0.573
PG21	0.529	0.563	0.459	0.693	0.603
PG22	0.528	0.573	0.463	0.699	0.592
PG23	0.520	0.518	0.520	0.696	0.619
PP12	0.430	0.445	0.320	0.554	0.369
PP13	0.566	0.569	0.475	0.720	0.563
PP14	0.548	0.558	0.433	0.714	0.525
PP15	0.343	0.411	0.370	0.549	0.384
PP16	0.534	0.541	0.417	0.725	0.510
PP17	0.570	0.586	0.530	0.781	0.642
PP18	0.470	0.487	0.447	0.690	0.516

SF12	0.595	0.598	0.590	0.654	0.778
SF13	0.678	0.636	0.615	0.667	0.820
SF14	0.693	0.635	0.594	0.674	0.834
SF15	0.619	0.605	0.578	0.610	0.739
SF16	0.611	0.600	0.501	0.551	0.697
SF17	0.584	0.591	0.606	0.540	0.716
SR1	0.516	0.526	0.496	0.451	0.675
SR2	0.551	0.540	0.593	0.529	0.766
SR3	0.587	0.594	0.596	0.587	0.765
SR4	0.536	0.537	0.583	0.591	0.759
SR5	0.549	0.566	0.580	0.556	0.740
SS10	0.605	0.546	0.537	0.584	0.781
SS11	0.600	0.595	0.541	0.616	0.777
SS6	0.648	0.582	0.589	0.605	0.826
SS7	0.665	0.620	0.619	0.634	0.829
SS8	0.658	0.655	0.605	0.661	0.819
SS9	0.595	0.554	0.555	0.584	0.784
SU18	0.471	0.453	0.632	0.453	0.637
SU19	0.552	0.525	0.596	0.517	0.766
SU20	0.584	0.552	0.639	0.567	0.763

**APPENDIX I**  
**TEST OF HARMAN'S SINGLE FACTOR**

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	46.171	44.826	44.826	46.171	44.826	44.826
2	5.916	5.744	50.570			
3	3.954	3.839	54.409			
4	2.954	2.868	57.276			
5	2.243	2.177	59.453			
6	2.152	2.089	61.543			
7	1.800	1.747	63.290			
8	1.668	1.619	64.909			
9	1.548	1.503	66.413			
10	1.319	1.280	67.693			
11	1.266	1.229	68.922			
12	1.198	1.163	70.085			
13	1.181	1.147	71.232			
14	1.067	1.036	72.268			
15	1.057	1.026	73.295			
16	1.024	0.994	74.289			
17	0.965	0.937	75.226			
18	0.946	0.918	76.144			
19	0.888	0.862	77.006			
20	0.849	0.824	77.830			
21	0.806	0.782	78.612			
22	0.778	0.755	79.368			

23	0.744	0.722	80.090
24	0.735	0.713	80.803
25	0.715	0.694	81.497
26	0.692	0.672	82.169
27	0.678	0.658	82.827
28	0.637	0.618	83.446
29	0.618	0.600	84.045
30	0.607	0.589	84.634
31	0.565	0.549	85.183
32	0.539	0.523	85.706
33	0.534	0.519	86.225
34	0.520	0.505	86.730
35	0.511	0.497	87.227
36	0.489	0.475	87.702
37	0.472	0.458	88.160
38	0.465	0.451	88.612
39	0.452	0.439	89.051
40	0.432	0.420	89.470
41	0.420	0.408	89.879
42	0.405	0.393	90.272
43	0.395	0.383	90.655
44	0.386	0.375	91.030
45	0.366	0.356	91.386
46	0.351	0.341	91.727
47	0.342	0.332	92.059
48	0.321	0.312	92.371
49	0.320	0.310	92.681
50	0.301	0.292	92.974
51	0.293	0.285	93.258
52	0.288	0.280	93.538

53	0.276	0.268	93.807
54	0.270	0.262	94.069
55	0.264	0.257	94.325
56	0.260	0.252	94.578
57	0.254	0.247	94.824
58	0.245	0.238	95.062
59	0.240	0.233	95.295
60	0.230	0.223	95.518
61	0.228	0.222	95.740
62	0.211	0.205	95.945
63	0.204	0.199	96.143
64	0.199	0.193	96.336
65	0.190	0.184	96.520
66	0.183	0.177	96.698
67	0.181	0.176	96.874
68	0.169	0.164	97.037
69	0.162	0.157	97.194
70	0.158	0.154	97.348
71	0.153	0.148	97.496
72	0.148	0.144	97.640
73	0.138	0.134	97.775
74	0.134	0.130	97.904
75	0.128	0.124	98.029
76	0.121	0.117	98.146
77	0.120	0.116	98.262
78	0.113	0.109	98.372
79	0.111	0.108	98.479
80	0.107	0.104	98.583
81	0.105	0.102	98.685
82	0.100	0.097	98.782

83	0.093	0.090	98.873
84	0.088	0.086	98.958
85	0.083	0.081	99.039
86	0.081	0.078	99.117
87	0.080	0.078	99.195
88	0.076	0.074	99.269
89	0.072	0.070	99.339
90	0.072	0.070	99.409
91	0.069	0.067	99.475
92	0.064	0.062	99.537
93	0.062	0.060	99.598
94	0.061	0.059	99.656
95	0.057	0.055	99.712
96	0.046	0.044	99.756
97	0.045	0.044	99.800
98	0.044	0.043	99.843
99	0.042	0.041	99.884
100	0.034	0.033	99.917
101	0.033	0.032	99.949
102	0.027	0.027	99.975
103	0.025	0.025	100.000

Extraction Method: Principal Component Analysis.