The Development And Significance Of Business Intelligence (BI) Platforms In Facilitating The Decision-Making Process In Dubai Government Entities: A Case of Dubai Statistics Centre

تطوير وأهمية منصات ذكاء الأعمال في تسهيل عملية صنع القرار في الجهات الحكومية في دبي: حالة مركز دبي للإحصاء

by

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ABSTRACT

Business Intelligence (BI) technologies provide a flexible platform for businesses to properly store, process, analyse and report data and processes. The use of BI technologies in handling critical data and facilitating data-driven decision making (DDD) has been realised by many literature studies.

However, its application and benefits for the Dubai government entities for effective data management and decision making have not been investigated before. Thus, the current study has focused on analysing the significance of BI platforms in improving the decision-making process in the Dubai Statistics Center (DSC), a governmental entity in Dubai. Using secondary research design, the study determined factors that impact the decision-making process in Dubai government entities. Furthermore, the significance of using the BI platform for decision-making is established in the light of academic and empirical evidence. A BI platform using ArcGIS software is also developed demonstrating the visual and realistic application of interactive data in decision-making regarding different aspects of DSC such as population, marriages, education, etc.

The recommendations are provided retarding the effective use of BI platforms in DSC and other government entities in Dubai. The current study will contribute to knowledge and practice to promote the use of BI platforms in making effective decisions. Future work includes integration with Artificial Intelligence (AI) for the AI-based BI platforms which would allow the translation of theoretical solutions into actionable tasks.

الملخص

توفر تقنيات ذكاء الأعمال و هي منصة مرنة للشركات لتخزين البيانات والعمليات ومعالجتها وتحليلها والإبلاغ عنها بشكل صحيح. لقد تحقق استخدام تقنيات ذكاء الأعمال في معالجة البيانات الهامة وتسهيل اتخاذ القرار المستند إلى البيانات من خلال العديد من الدراسات الأدبية.

ومع ذلك ، لم يتم التحقيق من قبل في تطبيقه وفوائده للهيئات الحكومية في دبي لإدارة البيانات واتخاذ القرار بشكل فعال. وبالتالي ، ركزت الدراسة الحالية على تحليل أهمية منصات ذكاء الأعمال في تحسين عملية صنع القرار في مركز دبي للإحصاء ، وهو كيان حكومي في دبي. باستخدام تصميم البحث الثانوي ، حددت الدراسة العوامل التي تؤثر على عملية صنع القرار في الجهات الحكومية بدبي. علاوة على ذلك ، يتم تحديد أهمية استخدام منصة ذكاء الأعمال لاتخاذ القرار في ضوء الأدلة الأكاديمية والتجريبية. تم أيضًا تطوير منصة ذكاء الأعمال باستخدام برنامج ArcGIS لإظهار التطبيق المرئي والواقعي للبيانات التفاعلية في صنع القرار فيما يتعلق بجوانب مختلفة من مركز دبي للإحصاء مثل السكان والزواج والتعليم وما إلى ذلك.

تم تقديم التوصيات التي تؤخر الاستخدام الفعال لمنصات ذكاء الأعمال في مركز دبي للإحصاء والهيئات الحكومية الأخرى في دبي. ستساهم الدراسة الحالية في المعرفة والممارسة لتعزيز استخدام منصات ذكاء الأعمال في اتخاذ قرارات فعالة. يتضمن العمل المستقبلي التكامل مع الذكاء الاصطناعي لمنصات ذكاء الأعمال القائمة على الذكاء الاصطناعي والتي من شأنها أن تسمح بترجمة الحلول النظرية إلى مهام قابلة للتنفيذ.

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CHAPTER 1

INTRODUCTION

1. Introduction

The technological advancements and shifts across the globe have impacted all kinds of business models (Morrar, et al., 2017). In this rapidly developing and high-tech business market, several emerging technologies have impacted the way businesses are conducted. Huh and Lee (2018) stated that this advancement is linked to industrial revolution 4.0 as emerging technologies like the Internet of things (IoT), Business Intelligence (BI), Artificial Intelligence (AI) and cloud computing has facilitated innovation in all business operations. Azeroual and Theel (2018) highlighted that data volumes have rapidly increased due to automatic means of data management and collection, the handling of big data has become challenging. Divan (2017) determined that the decision-making process requires the consideration of premises, assumptions, and context connected to the decisions that should be taken. It is stated in the report published by Deloitte (2018) that recent improvements in the collection, storing and process of data have increased the reliance on data processing particularly data-driven decision making (DDD). Furthermore, MCelheran (2015) mentioned that DDD has contributed to a revolution in business management easing the decision-making process based on facts rather than assumptions. Bousdekis et al. (2021) mentioned that the dynamically changing business markets across the globe demand and support data-driven decision-making by incorporating novel algorithms and methods like Business Intelligence (BI).

The benefits of using BI platforms for proper data handling, storing, processing, and accessing have been highlighted by various studies (Nuseir, 2020; FAHR, 2022; Jadi and Jie, 2016). Trieu (2017) stated that the global business market is facing an intense rivalry between traditional and online businesses, thus technologies like BI systems are crucial to making effective decisions. Nuseir (2020) mentioned that integrating BI platforms in the operations will provide transparency to the processes which can be analysed and decisions can be made based on them. Ul-Ain et al. (2019) declared that the major benefit of integrating BI technology is that it allows systematics

monitoring, transformation, and guidance of the scarce and weak knowledge based on which actionable information is retrieved and significant development decisions are taken. Although various mentioned studies have established the significance of using BI platforms, an investigation particularly on the UAE context related to Dubai government entities has not been determined. The purpose of the current investigation is to analyse the development of BI platforms and their significance in the decision-making of Dubai Government entities. The secondary research design will be used for analysing the significance of BI platforms in the decision-making process in Dubai government entities. Furthermore, a BI platform will be created using ArcGIS software using data downloaded from Dubai Statistics Center (DSC, 2020).

1.1. Background

Business Intelligence (BI) refers to the group of technologies and methods used in a business organisation to handle, manage and make sense of the data and utilise the data in an effective manner such as data-driven decision-making (DDD). As mentioned by Velosa et al. (2021), the origins of BI platforms go way back to 1965. Ahmed et al. (2019) mentioned that the first organisation that used the BI platform was Gartner Group Inc dating back to 1996. However, BI systems only became prevalent in the literature and practice in the twentieth century with the technological shift across the globe. Since, 1971, the UAE government has been continuously looking for novel ways to improve the quality of life and standards in the country. BI platforms have been widely used for data storing and management in UAE, the local and national governments have realised the significance of the information technology and novel methods of data management. The current study has chosen Dubai Statistics Center (DSC), which is an organisation that is controlled and operated by the Dubai government. The organisation is responsible for maintaining statistical information concerning social, economic, and demographic sectors in the city (DSC, 2021). The main services of this organisation are for the government, businesses, and individuals. Statistical maps, interactive statistics, and digital information are provided on the website operated by Dubai Statistics Center (DSC, 2021). The organisation handles a large amount of data and integration of the BI platform will be beneficial in effective decision making regarding different sectors in Dubai. A BI platform is developed using data downloaded

from the website to demonstrate the development and significance of BI intelligence for effective decision-making in Dubai government entities like DSC.

Al-Marzouqi (2019) stated that the electronic government (e-Government) strategic plan 2011-2013 was also launched for technological integration in governmental processes. Federal Authority for Government Human Resources launched the BI system in 2014 to provide services to all governments and ministries (FAHR, 2022). Furthermore, National Advanced Sciences Agenda was announced as part of vision 2031 of UAE aiming to incorporate advanced technologies in all sectors (UAE, 2018). The implementation of information and communication technologies in various areas of governmental processes has contributed to the improved quality of services in the UAE. An investigation regarding the role of BI platforms in government entities in Dubai will be beneficial to reveal challenges and benefits. Presently, the literature review revealed no information regarding the development of a BI tool specifically for Dubai government entities facilitating their decision-making process. The current study will include the development of BI platforms and secondary research analysis for its significance in the decision-making process of Dubai government entities.

1.2. Research Context

The government entities are referred to as that development, enterprises, and organisations that are closely linked to and generally owned by the government or simply controlled by the local or national government (ROC, 2020). Barabash et al. (2017) mentioned that information technology (IT) is crucial for all kinds of businesses and the government entities in Dubai, the novel technologies like BI are critical for effective data management and decision-making. The implementation of the BI platforms across the globe gradually increased since 2012 however during that year only 10% of the business owners considered BI as a critical technology. By 2020, conversely, the BI platforms implementation rapidly increased and augmented in numbers thus marking its significance for effective data handling. In 2020, about 54% of business enterprises agreed that BI platforms are crucial for their present and future developments (Joghee, et al., 2021).

The gradual increase of BI platforms suggests that challenges in its implementation are being addressed related to data management. It should be noted that the major principle in any

information system is the effective flow of information. Azeroual and Theel (2018) stated that using ICT and novel technologies like BI platforms in government entities requires a proper flow of information and data handling. About this, Jadi and Jie (2016) argued that BI projects must consider the flow of information an important aspect in achieving the desired outcomes and increasing the effectiveness of the decision-making process in government entities. The current study focuses on analysing the significance of BI platforms in facilitating data-driven decision-making in the Dubai government entities. The implementation of the BI platform will be done using ArcGIS software, the data is downloaded from the websites of Dubai Statistics Center (2020).

1.3. Problem Statement

In UAE, government entities and businesses are strongly focusing on innovative technologies and an intelligent system like Artificial Intelligence (AI) approaches cloud computing and BI platform to bring efficiency and improvements (Al-Marzouqi, 2019). The vision 2031 for UAE includes an aim to transform the government into an intelligence government by incorporating AI at all levels (UAETC, 2022). It is stated by Brynjolfsson and Mcelheran (2019) that business and government entities generate an ample amount of data that is not effectively utilised. The report published by JBA (2018) mentioned that proper data storing, accessing, and processing can facilitate the process of effective decision-making. For instance, the data generated from the Dubai Statistics centre can be useful for government entities in making important decisions. However, Divan (2017) argued that data and information are two different concepts: data can be collected from different sources but it's not certain that it will be traceable, consistent, and comparable. Thus, an intelligent system is necessary to determine the boundaries, assumptions, context, and premises of the data as decision making requires the information about the entity under examination. Concerning this, Azeroual and Theel (2018) highlighted BI systems or platforms allow businesses to manage critical data, the processes are made transparent and intelligent that in turn facilitates effective decision making. In a nutshell, the current study focuses on the problem of data-intensive rapid development and abundance of data handling technologies, proposing BI platforms as a solution for Dubai government entities for effective data management and data-driven decision making. Secondary research is conducted using the mixed methodology to analyse the significance of BI platforms and data-based decision-making in the Dubai Government entities. Furthermore, The implementation

of a BI platform will also be performed to address the problem area proposing BI tool as a solution for effective decision making in Dubai government entities.

1.4. Aim:

This dissertation aims to analyse the development and significance of business intelligence (BI) platforms in facilitating the decision-making process in Dubai government entities. The relevant objectives and questions to achieve the aim are discussed below.

1.4.1. *Research Questions*

- What is the importance of data-driven decision-making for Dubai government entities?
- How the development of a BI platform will improve the decision-making process for Dubai Statistics Center?

1.4.2. *Research Objectives*

- To determine factors impacting the decision-making process in the Dubai government entities.
- To develop and analyse the significance of the BI platform in the effective decision-making of the Dubai Statistics Center.
- To evaluate and provide recommendations regarding the use of the BI platform in the Dubai Statistics Center for effective decision-making.

1.5. Contributions of the Research

There are two main contributions of the current investigation. The first contribution is towards the academic field and knowledge arena as the generated information will be shared across the domain for implications and further progression. This kind of contribution is viewed as a contribution to knowledge or theory, Holweg et al. (2015) stated that making a theoretical contribution is a presumed and foremost characteristic of any research study. Another contribution of the study is to the practice in the management field such as government entities in Dubai. The analysis of the significance and development of BI platforms for effective decision-making in Dubai government entities has produced practice and policy implications for concerned government departments. Understanding the factors that impact the decision-making process is necessary for effective data-driven decision-making (Divan, 2017). Furthermore, the recommendations are also provided for

the Dubai government entities in addressing the data-related challenges and incorporating BI systems as an effective solution for data-driven decision-making. Lastly, the development of a BI tool for decision-making in Dubai government entities will contribute to the theory and practice by establishing the significance of BI platforms and analysing the development process of this technological tool.

1.6. Expected Outcomes

The current study is expected to deliver the following outcomes:

- A secondary research analysis of the BI platforms establishes the significance of using intelligent systems for data-driven decision-making.
- A BI tool for effective decision making in Dubai Statistics Center
- A dataset consisting of data from the Dubai Statistics centre to be used for future related work and solutions
- A set of recommendations regarding the use of BI platforms in the Dubai Statistics Center.

1.7. Dissertation Outline

This dissertation includes about five chapters. The first chapter is the introduction regarding the problem area, research background, context, and study objectives. The second chapter is the literature review regarding the main variables of the study such as BI platforms, data-based decision making, and Dubai government entities. The literature includes both empirical and theoretical reviews of the previous work. Furthermore, an overview of the previous work done on the implementation of the BI tool will be discussed. The third chapter establishes the rationale and justification for selecting the methodology. The details regarding the implementation of the BI tool using ArcGIS will be discussed. The fourth chapter presents the major themes analysed using data analysis techniques and the results retrieved from the implementation of the BI platform. The last chapter is the conclusion and recommendations that provide a coherent conclusion of the results and the representation. Furthermore, the recommendations regarding BI platforms in Dubai government entities are also discussed.

CHAPTER 2

LITERATURE REVIEW

2. Introduction

The chapter provides an account of literature studies and a critical analysis of previous research done on the problem area. The theories related to BI platforms, Information Technology adoption, and development are discussed in the first half of the section. The second half includes an empirical review of previous studies and techniques related to BI platform development for decision making. A summary of both parts is provided after this chapter for a complete picture of the literature review. Furthermore, the gaps found in the literature regarding the BI platforms, previous work, and DDD are explicitly determined and discussed at the end.

2.1. Theoretical Review

2.1.1. Diffusion of Innovation Theory

The Diffusion of innovation theory (DOI) was introduced by E. M. Rogers in the year 1962 (LaMorte, 2019). The main principle of this theory is that the adoption of novel ideas, services, or behaviour does not happen instantly. The theory argues that adoption of innovation is a gradual process that involves five different categories of adopters as illustrated in Figure 1.

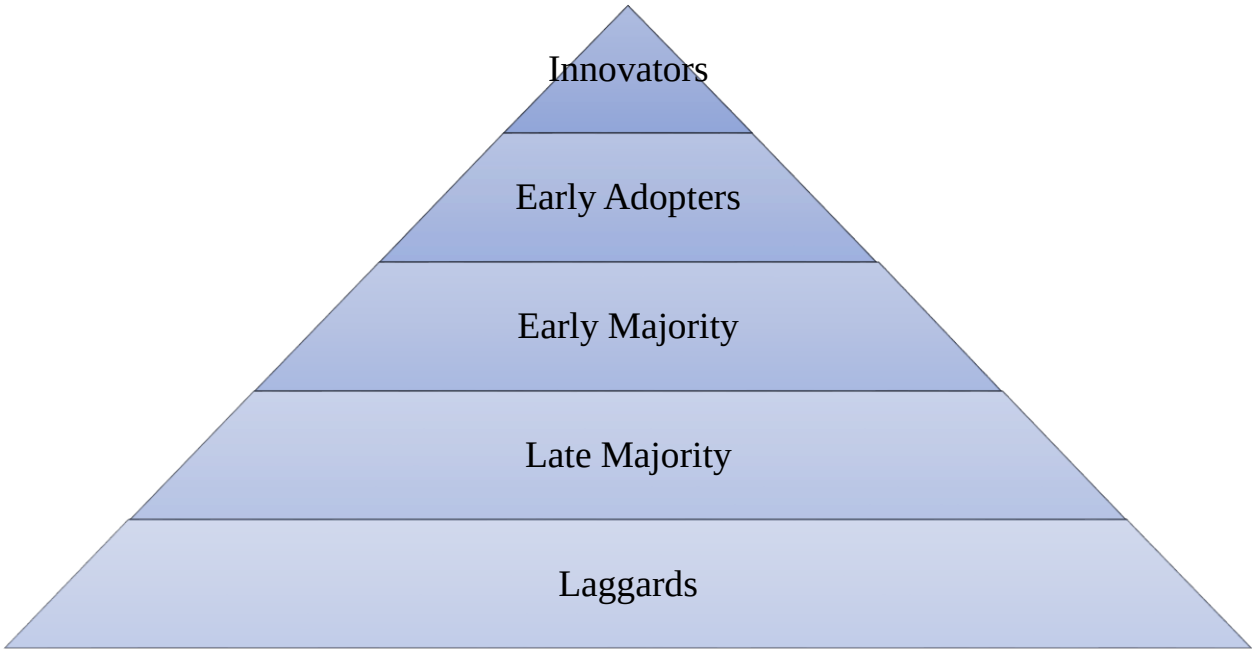

Figure 1: Diffusion of Innovation, Source: (LaMorte, 2019)

Dearing and Cox (2018) commented on the DOI and stated that motivation and needs across these categories differ depending on their innovativeness level. The majority of the people lie in the middle categories of being either early majority or late majority adopters, the laggards are among those who are not pressured by society and take their time to innovate. Whereas the early adopters are those potential innovators driven by their motivation, and very few of these become innovators which is 2.5% shown in Figure 2.

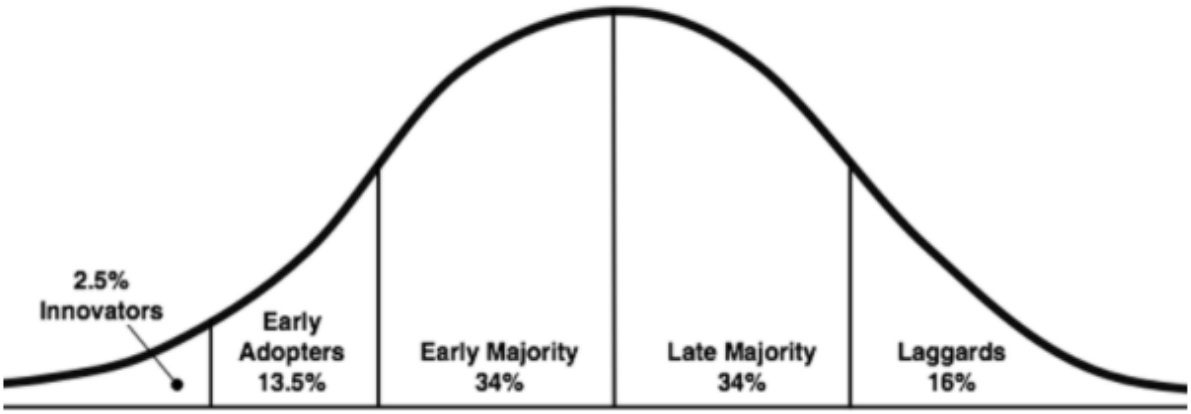

Figure 2: Categories of Adopters, Source: (Dearing and Cox, 2018)

This theory has been used in the current study to explain the adoption of BI platforms in Dubai government entities. Relating DOI with BI technology, DOI determines three types of factors that impact an entity's BI adoption such as internal factors (size, complexity, structure, and centralisation), external factors (openness), and CEO or manager-related factors (leader's innovativeness and knowledge, openness to change) (Ahmadi and Zare, 2020). The DOI theory is suitable to understand the challenges that may come across for the Dubai government entities during the adoption of BI platforms for effective data-based decision-making. Ain et al. (2019) mentioned that the applicability of DOI to explain the factors that could impact the adoption and acceptance of BI platforms in large enterprises is validated as both practitioners and researchers have demonstrated. Many studies have stated that DOI is suitable to explain and identify the determinants of BI adoption such as complexity, relative advantage, observability, compatibility, trialability shown in Figure 3 (Ahmad, et al., 2016; Watson, 2015).

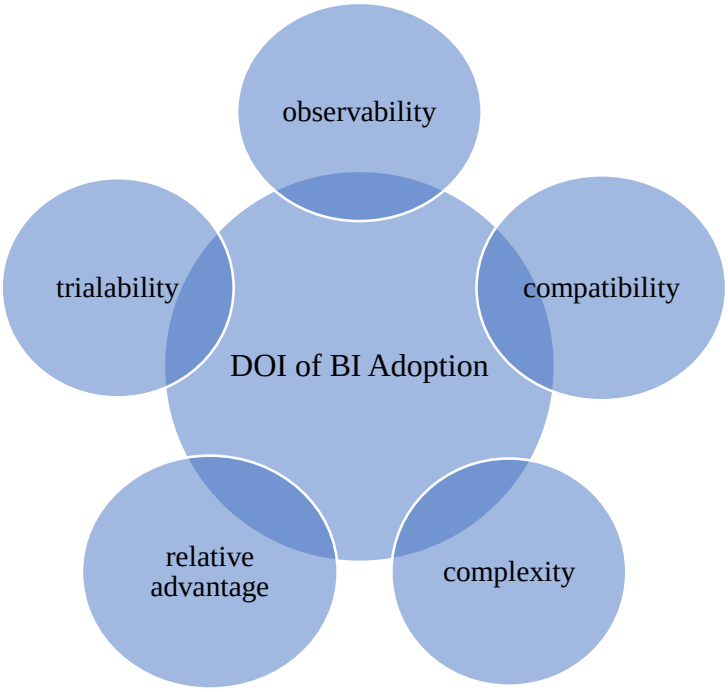

Figure 3: DOI of BI Adoption, Source: (Rouhani, et al., 2018)

El-Adaileh and Foster (2019) argued that the initial application of the BI platform is explained using forces such as visibility, compatibility, observability, and trialability whereas the result demonstrability and the relative advantage of BI is related to perception towards its continuous usage. Ahmad et al (2016) conducted a study on factors influencing BI implementation and found that relative advantage, compatibility with the existing systems, and observability were among the most significant factors. Whereas, the study found that complexity and trialability were not as significant. These findings are against the implication produced by Watson (2015), viewing it from the lens of DOI and determining diffusion stages to BI adoption, it was found that requirement analysis is among the critical aspect that needs to be prioritised due to the complexity of BI. Gartner (2015) mentioned that due to the complexity, time-consuming nature, and costs involved with BI platforms, most businesses only use it at the departmental level for larger projects. The current study uses DOI to view the BI platform and concluded that Dubai government entities should focus on all the factors that may impact its adoption and successful deployment. The criticism of the DOI theory for explaining the BI adoption argues that the DOI does not consider environmental aspects which are necessary for effective deployment of the technology (Stjepic, et al., 2021). In addition

to that, Hatta et al. (2015) stated that DOI theory discussed technological adoption at a global level and focuses on forces that influence the speed of adoption. The BI platform can effectively be viewed from the DOI perspective to understand the internal, external, and manager-related factors that may impact BI adoption in Dubai Statistics Center. However, an examination of factors that may impact the development of BI tools and successful deployment in DSC requires a further theoretical basis and an empirically supported framework.

2.1.2. Technology, Organisation, and Environment (TOE) Framework

Another widely used framework related to the adoption of technologies like BI is the Technological-Organisation-Environment (TOE) framework introduced by Tornatzky and Fleischer in 1990 (Chiu, et al., 2017). The main concept of the TOE framework is that factors related to technology infrastructure, market relations or environmental characteristics, and organisational factors like management support and enterprise relations are relevant for the successful deployment of BI technology. In contrast to DOI, the TOE framework provides a broad perspective of the factors that might influence the adoption of BI including social relations, infrastructural capabilities, mechanisms, and relations (internal and external) of an organisation. Stjepic et al. (2021) discussed that the TOE framework is different from the DOI as it includes environmental factors which are not thoroughly considered in DOI; it is further argued in the same study that the TOE framework is more complete and better in explaining the intra-firm level technology adoption. Owusu et al. (2017) designed a model based on the TOE framework using its three categories shown in Figure 4 to explain the BI adoption and acceptance. Owusu et al. (2017) and Ahmadi and Zare (2020) concluded similar findings that factors related to systematic, individual, and organisation should be examined in isolation. On the contrary, Nino et al. (2020) argued that BI governance should be studied in the process, communication operational, and strategic layers. The current supports the findings of Owusu et al. (2017) that organisational, technological, and environmental factors related to BI adoption should be examined separately.

Kusuma et al. (2020) supported that technological adoption leads to productivity and efficiency but it also impacts behaviours in the society and may contribute to reducing social disparities. Jeon et al. (2020) determined that technology innovation impacts the service sectors rapidly transforming the relationship between buyer and seller. The technological context in the TOE framework is more

or less similar to the compatibility concept in the DOI related to BI adoption. Studies (Hart and Ojiabo, 2016; Wang, et al., 2016; Chiu, et al., 2017) reported that compatibility is among the most important factors for any organisation adopting BI. The organisational context in the TOE framework implies technological readiness and as well as human readiness indicated by the required expertise and skills and management support. Studies (Wang and Wang, 2016; Maduku, et al., 2016) noted that technological readiness in terms of infrastructure, management support, and expertise are equally important indications of successful BI adoption and deployment. The environment context includes competition and pressure of advancement that promotes an organisation to adopt novel technologies like BI (Bhatiasevi and Naglis, 2020). It also includes vendor support as an internal environment factor providing maintenance and update services for BI technology (Chatzoglou, et al., 2017). Lo and Ng (2017) argued that vendor support is a necessary factor as it will facilitate continued use of the technologies like BI providing appropriate implementation and post-implementation assistance. Hatta et al. (2015) argued that the TOE framework is supported by various empirical studies and provides a basis to explain the technological adoption, though the factors related to the three contexts as shown in Figure 4 vary across many studies. The TOE framework is used as it is empirically supported by various studies in its relevance to BI adoption leading to successful deployment. It is suggested that DSC and other government entities should consider the adoption of BI using the DOI and TOE framework as a theoretical basis and address the implementation and post-implementation challenges.

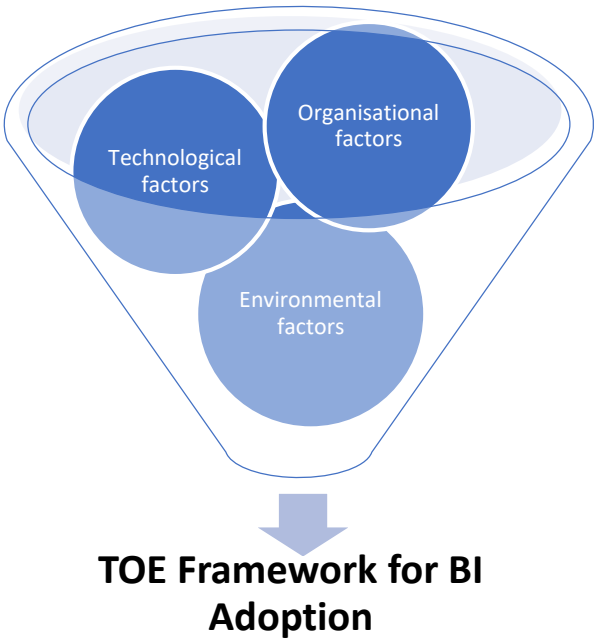

Figure 4: TOE framework of BI Adoption, Source: (Hatta, et al., 2015)

2.1.3. Rational Model of Decision Making

The main idea behind the rational model of decision-making is that individuals must use factual information, analysis, and systematic process to reach a decision (Stobierski, 2019). It is the opposite of the intuitive or non-rational model of decision making that incorporates assumptions, beliefs, and gut feelings to make decisions (Gigerenzer and Gaissmaier, 2015). Uzonwanne (2016) mentioned that the rational model of decision making may include several processes that vary across different studies, nevertheless, the common steps are shown in Figure 5: these include problem identification, solution, gap analysis, data collection, optimisation, and reaching a decision. Red stated that determining the problem is usually the first step to deciding as solution determination requires in-depth problem identification.

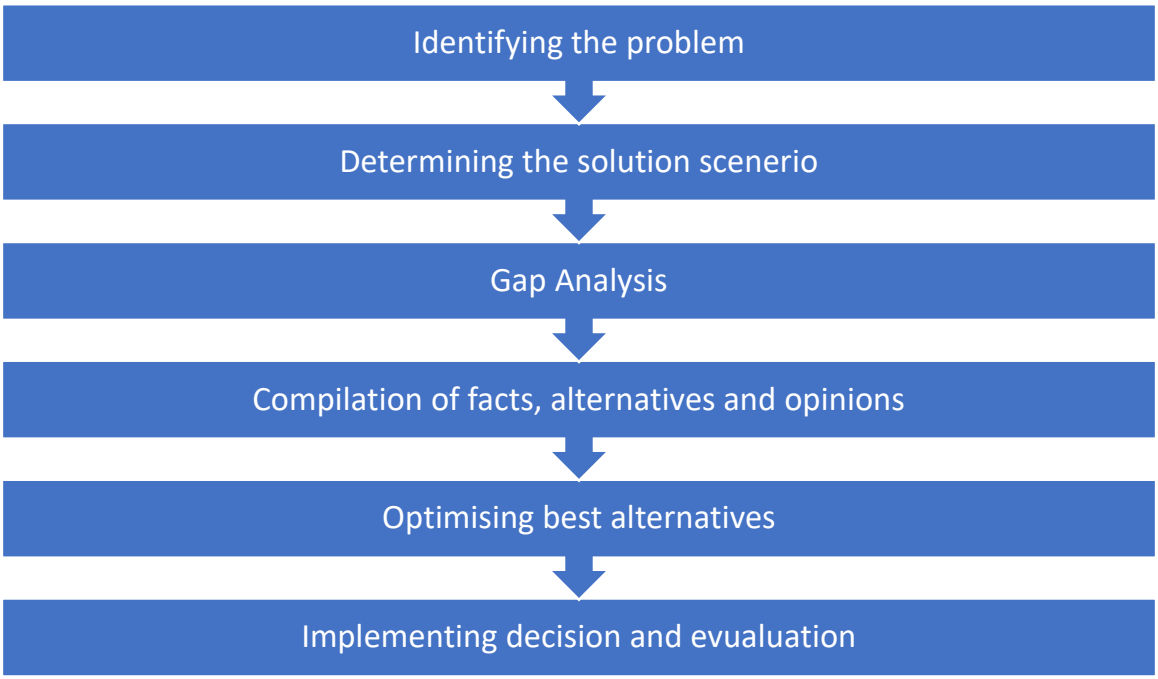

Figure 5:Rational Model of Decision Making, Source: (Uzonwanne, 2016)

The rational model of decision-making is essential in understanding the significance of data-driven decision-making, Mandinach and Schildkamp (2021) highlighted that the current advancement in the world has led to the evolution of data-driven decision-making. The focus from one source or type of data has been shifted to multiple sources and a variety of data for in-depth analysis and broad outcomes. Bazerman and Moore (2015) mentioned that decision-making is among the key factors for the success of an organisation. According to Pranjic (2018), people supporting the rational model of decision-making follow systematic steps or stages as shown in Figure 5 whereas the processes in the non-rational model of decision-making are random and dynamic. Gigerenzer and Gaissmaier (2015) argued that the rational model of decision-making does not consider factors that are not quantifiable but can very well affect the quality of the decisions, this includes personal judgment, emotions, prejudice, and intuition.

The overseeing of these factors by the rational model decision-making indicates its limitations to be effective in uncertain situations. The supporters of the non-rational model argue that though data and information are relevant, in the end, it is the manager or CEO who makes the decision. Concerning this, Carucci (2016) stated that great decision-making is aligned with the balance

between analytics and intuition. The concept of bounded rationality is thus relevant to the current discussion as it views decision-making as a process that is based on the logical ground however validating the condition that people's beliefs play a part in their decision-making based on limited data. In the current context, the rational model of decision-making is valid as the development of the BI platform for Dubai Statistics Center involves less consideration of uncertain situations. The current focus is on the significance of data-driven decision-making without necessarily arguing against the other types of decisions in which intuition or beliefs are involved. The focus is to avoid the risk of making a wrong decision, Kubinaa et al. (2015) argued that BI technologies enhance the decision-making quality by utilisng data understandable from visualisation and analytics. The rational model of decision-making is relevant to the implementation of BI as it demonstrates the significance of data-driven decisions. Larsen (2016) argued that researchers who make a rational decision and follow a systematic process save several hours of consideration, decide fasters, and the outcomes are improved by 20%.

2.2. Empirical Review

2.2.1. The fundamentals of Business Intelligence (BI)

Hatta et al. (2015) argued that there is no single definition that can explain the phenomenon of BI, over the years the concept has been revolutionised through several studies. Heang (2017) stated that BI was looked upon as a private vision and mainly used by businesses in the software and technology field as it was not viewed as open knowledge. Solberg (2015) argued that it is still vastly used by software engineers and software businesses pointing out that its benefits have not been fully realised in the conventional business markets. Nevertheless, the academic literature, practitioners, and researchers have come up with several different definitions, the main themes remain constant such as translating data into useful information (Ahmad, et al., 2020; Ahmadi et al., 2020). Grossmann and Rinderle-Ma (2015) reviewed different definitions of BI and provided four fundamental aspects of BI such as the main task, its basis, realisation, and the outcomes. Figure 5 illustrates that the major task is providing decision support, the basis is empirical data or different types of information, the realisation is that the system requires ICT approaches and the delivery of BI is to deliver the right kind of information to the right person in an effective manner. All these fundamental aspects are necessary to be focused on for the effective implementation of BI in DSC.

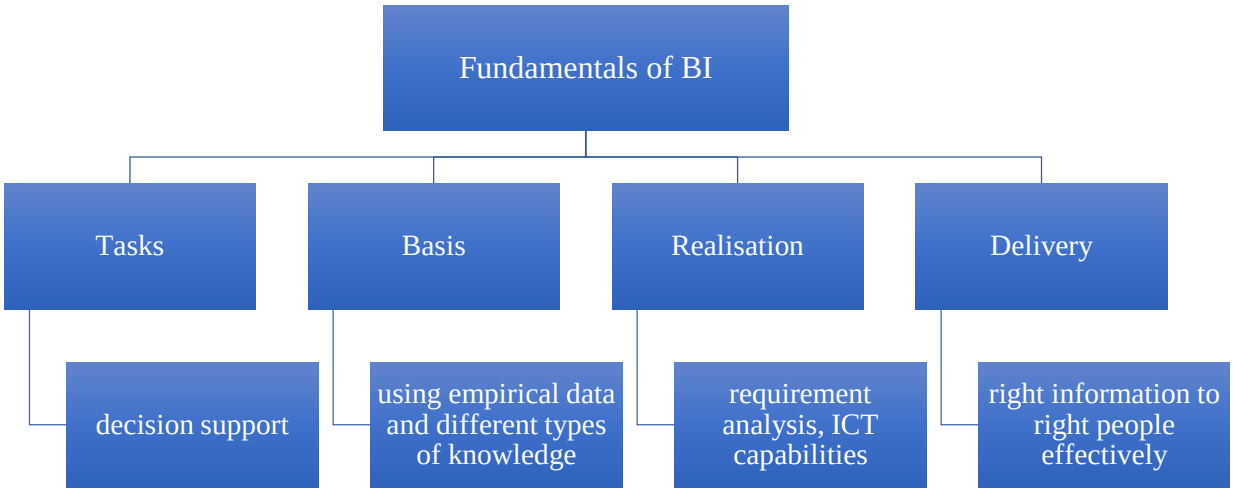

Figure 6: Fundamentals of BI, Source: (Grossmann and Rinderle-Ma, 2015)

Ain et al. (2019) mentioned that BI is among the novel technologies that enable CEOs and managers to integrate sources of data and process a large amount of data, translate it into usable knowledge and retrieve necessary information. Kabakchieva (2015) highlighted that most organisations utilise BI platforms to gain a competitive advantage in the business world. Ahmad et al. (2020) also noted that having BI in the organisation has become imperative in this rapidly changing business world. Combita Niño et al. (2020) commented on the significance of BI platforms that it allows organisations to gather and evaluate large datasets to examine their weaknesses, possibilities, and strengths. Cheng et al. (2020) pointed to the increasing competition in the business world and stated that decision-making organisations like Dubai government entities, CEOs, and company leaders have realised that the BI tool is a logical priority at this stage. Salisu et al. (2021) highlighted that BI platform and implementation significance is evident in figures: UL-AIN the BI usage globally increased by 7.3% in 2017. The report published by Gartner (2017) mentioned that the BI market is expected to reach 18.3 billion dollars in 2017 and further progress to reach 22.8 billion dollars by 2020.

Concerning this, Puklavec et al. (2018) argued that despite growing significance and increased investment, many businesses did not achieve the desired outcomes pointing towards the challenges associated. On the contrary, many businesses have not taken the BI initiative due to a lack of resources, skills, and budget. Sun et al. (2018) suggested that organisations must determine the

correct determinants for effective implementation and achieve desired outcomes by integrating the BI platform. In the current context, it is argued that BI development requires a systematic approach and it is necessary for the organisation adopting BI to fully understand its concept and conduct a requirements analysis for its effective implementation. Furthermore, the fundamentals of BI should be deeply investigated and applied during the implementation and adoption of the BI platform by DSC and other government entities.

2.2.2. BI Platform and Decision Making in Dubai Government entities

Ahmadi and Zare (2020) declared that the major purpose of the BI platform or system is to facilitate effective decision-making in the organisation, thus both structured and un-organised are crucial for this. Ain et al. (2019) stated that the BI platform promotes the decision-making process by incorporating unstructured and structured data, controlling, and collecting the necessary information about the data, and generating analysis solutions. Veeramisti et al. (2020) mentioned that the BI platform for decision-making requires screening, processing, and summarising data from multiple channels. Concerning this, Salisu et al. (2021) argued that due to the involvement of multiple data sources and variations, the overall process of BI implementation is complex. Regardless of this, the BI platforms and systems have gradually increased over the past years, however, not all organisations implementing BI platforms for decision making have achieved successful outcomes. Boyton et al. (2015) argued that more than 70% of businesses have not achieved the desired results of implementing the BI platform for decision-making despite abundant investments and planning. Farjami and Molanapour (2015) argued that for effective decision-making, the decision-makers require good data to come up with a significant and influential decision at the right place and time. On the contrary, Heang (2017) pointed to the leadership role as an important factor that BI platform success lies in its impact on the decision-making capabilities in an organisation. According to Alaskar and Efthimios (2015), the BI implementation is not successful for all organisations and some indicators should be carefully focused on and monitored by the organisation to determine whether the BI project would be a success or a failure. Thus, it is suggested that Dubai government entities like DSC must monitor the implementation of the BI tool closely to determine the indicators of success and failure and effectively address them. At present, fewer studies are discussing the potential of BI integration into governmental entities or

organisations, the BI implementation is highly and positively linked to the industrial sector (56%) as discussed in the study by Romero et al. (2021). Table 1 is provided below that presents the findings of 39 studies suggesting that governmental sectors such as government organisations are among the least impacted (8%) sectors by BI technology. The percentage indicates the number of studies that are published on the respective environment impacted by BI technology.

Table 1: Impact of BI on different environments, Source: (Romero, et al., 2021)

Environment	**Percentage**
Academic	21%
Governmental	8%
Industrial	56%
Social	15%

This indicates the significance of focusing on BI integration in governmental environments such as Dubai government entities like DSC. The readiness to technological change in Dubai government entities can be assessed by reviewing the UAE government's commitment to technological advancement. The UAE government has announced "Projects of the 50", a set of advanced projects aim to foster UAE's growth internationally and locally (UAE, 2021). Project 5Bn and Tech Drive Program are among these projects aiming towards advanced technology adoption and industrial revolution such as BI technology, Artificial Intelligence, Cloud computing, etc in UAE priority sectors (WAM, 2021). Furthermore, the UAE vision 2031 aims to integrate Artificial Intelligence technologies at all levels which will require effective implementation of BI platforms for data management and governance (Al-Marzouqi, 2019). Currently, the Decision support system is prevalently used by government entities in the UAE. Kasemap (2016) the difference between DSS and BI reporting is that BI platforms are flexible and compatible to work with big complex data whereas DSS has limitations in this regard. The Dubai government entities like DSC can benefit from the BI tool for making decisions related to developing more roads, more educational institutes, or encouraging marriages based on the population data and statistics.

2.2.3. BI Platform Development: Techniques and Previous Work

The discussion of how BI platforms are constructed or what is the generic architecture of the BI system that can be used for its development is very well integrated into the study by Heang (2017). Figure 7 is illustrated shows a pyramid of processes or stages that lead to the development of a BI tool or system. The architecture includes data sources, data warehouses, exploration of data through visualisation, data mining or modeling to learn the necessary information, optimising the alternatives, and finally reaching the decision stage as shown in the figure.

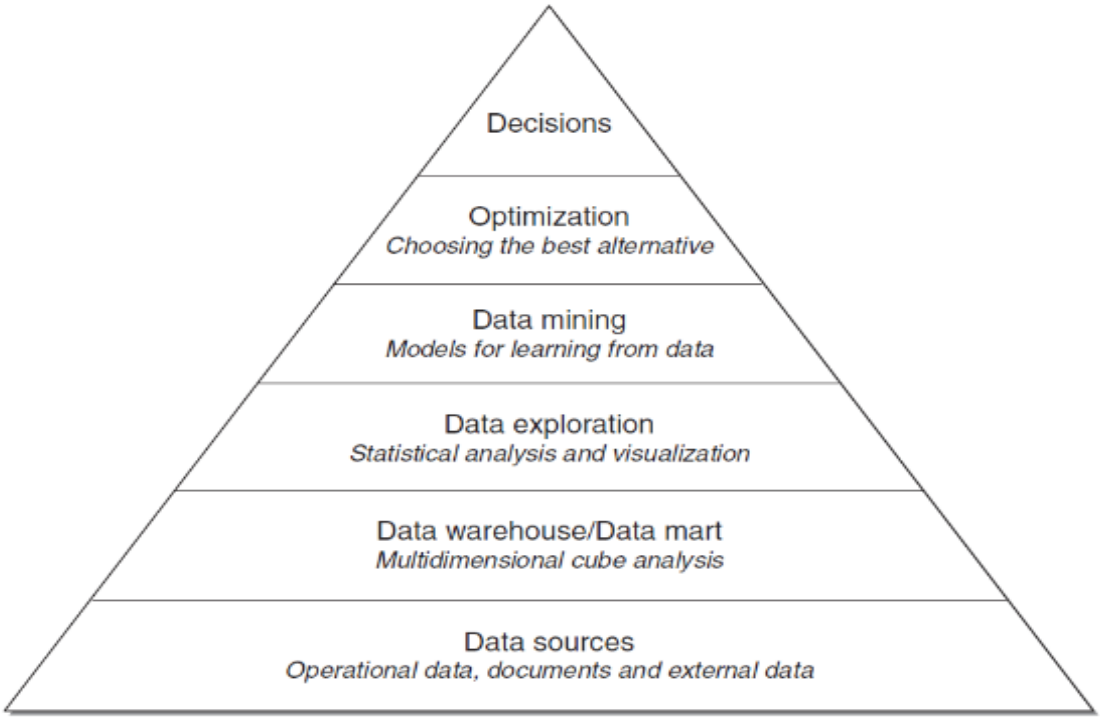

Figure 7: Structure of Business Intelligence, Source: (Heang, 2017)

Although the research suggesting the factors that are extremely important for successful BI implementation is limited, Heang (2017) provided an account of enabling factors related to BI project success. These include a focus on technologies such as suitable software and hardware technologies, analytics such as analytical approaches and mathematical modeling, and lastly human resources such as a high level of expertise and skills. One of the challenges faced by the organisations aiming to implement BI technology is the abundance of available tools and mechanisms (Romero, et al., 2021). A survey conducted by Gounder et al. (2016) explored the most commonly used tools for BI implementation and listed some of the data visualisation tools

such as Pentaho, Jasper Reports, Tableau, Palo/Jedox, Qlik, SpagoBI, etc shown in Table 2. The study by Priyadarshni (2020) provided a comparison of these tools to implement BI technology in large organisations with relevance to their application areas such as data visualisation, Business Intelligence, SaaS, etc shown in the table below. Passlick et al. (2020) argued that governmental entities in UAE are increasingly expecting their employees to make a data-based decision rather than based on assumptions to gain a competitive edge over others. Romero et al. (2021) stated that this practice requires rapid decision-making services and flexibility.

Table 2: Different BI tools and their applications, Source: (Romero, et al., 2021)

S. No.	BI Tool	Applications
1	Tableau	Data visualization products
2	Cognos	Performance management products
3	Sisense	Analyzes and visualizes big data sets and ideal tool for building interactive dashboards
4	SAP Business Objects	Real-time Business Intelligence
5	Microsoft Power BI	Interactive visualizations with self-service business intelligence capabilities
6	Domo	SaaS
7	Pentaho	Data integration, business analytics and big data
8	Klipfolio	Building real time business dashboards
9	Dundas BI	Data visualization
10	Necto	Business Intelligence

Apart from these mentioned tools for BI technology, there are different models, and library approaches used for its implementation. It can be said that the development of BI using different tools, models, and techniques vary across theory and practice. At a governmental level, a study is conducted by Moreno et al. (2018) regarding BI implementation in a government bank to identify areas where value must be added. The results demonstrated the positive impact of BI technology on its decision-making. Another case study related to two Mexican companies conducted by Mora (2020) provided the results revealing the benefits of BI technology. It was also reported that the results were highly dependent on the historical data and that information management in an organisation is crucial which is also linked to its maturity level as an organisation. The study

concluded that data management allowed the companies to meet their market expectations and survive effectively. In the current context, DSC has reached a high level of maturity and participates ineffective information management as evident by its website (DSC, 2021). Furthermore, the UAE government is highly committed to technological innovation and motivated all its sectors to ensure innovation and technologies like AI, blockchain, BI, and data analytics.

2.3. Literature Gap

The literature review was visited concerning both empirical and theoretical aspects. The theoretical aspects revealed that the most commonly used theories relevant to technology adoption like BI include DOI, TOE framework; whereas the rational model of decision-making established the significance of the data-driven decision. The theoretical analysis revealed that the TOE framework provides a broad consideration of aspects as compared to DOI (Chiu, et al., 2017; Hatta, et al., 2015). However, both are relevant for the current context of the study as they aid in the process of understanding the BI adoption in DSC from different perspectives (Ahmad, et al., 2016). The empirical studies revealed that there are fewer studies done on the integration of BI in governmental entities. Only 8% of studies were found that discussed the impact of BI on government environments (Romero, et al., 2021). This is identified as a gap in the literature that should be filled with more studies examining the impact of BI on government entities in Dubai. In addition to that, the studies related to the development of BI revealed that managers face challenges of deciding regarding the tools and approach to BI. The implementation of BI using ArcGIS has not been investigated in detail and a UAE context is missing in the current literature. The current study will provide an implementation process of BI using ArcGIS software and analyse its effectiveness for decision-making in DSC.

2.4. Summary

In conclusion, the most important theories relevant to BI adoption are DOI, TOE; and data-driven decision making is effectively explained by the rational model of decision-making. The DOI theory is advantageous in explaining the slow process of adoption of technologies like BI. On the contrary, the TOE framework effectively reveals the factors such as technological readiness, human readiness, management support, and environmental factors that can influence the BI adoption in

DSC. the rational model of decision-making significantly highlights the importance of data-driven decision-making. An overview of the BI and its fundamentals suggested that no single definition is agreed upon by scholars and practitioners. The supportive empirical studies are included that suggest the UAE government has been open and participative to technological change and advancement. The analysis suggests that there is a lack of studies suggesting BI's impact on government entities. Furthermore, the development of BI can be done using different tools like Power BI, Tableau, Necto, etc. The current study has proposed BI implementation using ArcGIS for effective decision-making in Dubai Statistics Center.

CHAPTER 3:

METHODOLOGY

3. Introduction

The chapter contains details regarding the methodology of the chosen study. According to the onion introduced by Saunders and Townsend (2018), the prime elements of the methodology include the selection of philosophy of research, the research approach, strategy, research design, data collection methods, etc as shown in Figure 8. In simple terms, the methodology educates regarding the techniques and methods used for data gathering and mechanism used for analysing the collected information. This chapter is providing all the relevant details regarding the methods and techniques employed for the study. It should be noted that the study aims to analyse the significance of BI platforms in facilitating the decision-making process in the Dubai government entities.

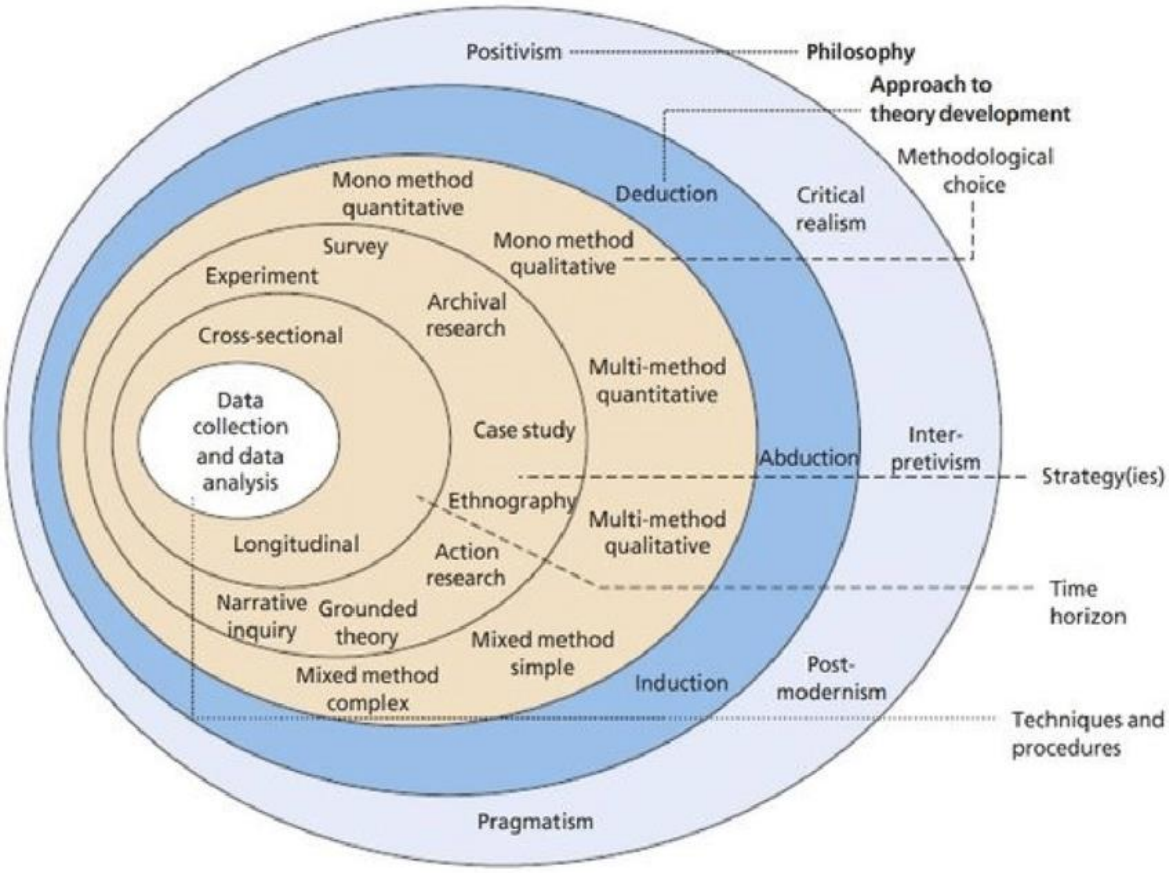

Figure 8: Methodological Onion, Source: (Saunders and Townsend, 2018)

Furthermore, A BI platform was developed using ArcGIS to analyse the development and effectiveness of this platform to facilitate data-driven decision-making in Dubai Statistics Center. In this dissertation, the methods for secondary analysis were utilised in addition to techniques related to the implementation of the BI platform. The first part of this chapter provides information regarding the secondary research design demonstrating the significance of BI platforms and data-driven decision-making in Dubai Government entities. The second part of this chapter provides details regarding the implementation of the BI platform.

3.1. Secondary Research Design

3.1.1. Philosophy

A researcher's view or belief system towards the idea and formation of knowledge is defined as the research philosophy (Saunders and Townsend, 2018). The major philosophies include critical realism, positivism, interpretivism, and pragmatism as shown in Figure 8. The current study has chosen pragmatism, Kaushik and Walsh (2019) stated that pragmatism supports the view that reality can be explained using factual information and as well as social interaction or human experiences. Using this philosophy, reality is effectively understood using conclusive information such as both qualitative and quantitative data. According to Kelly and Cordeiro (2020), pragmatism is beneficial in evaluating the research beliefs and systematically determining truth, thus it is different from other philosophies such as interpretivism and positivism because they are more inclined to retrieve knowledge or the formation of knowledge. Brierley (2017) highlighted that pragmatism offers a suitable worldview that aligns with the mixed methods research design. This is another reason for choosing pragmatism research philosophy as it offers a suitable philosophical view for mixed methods design. The current study has used pragmatism to collect both factual information such as quantitative data and qualitative data to address the research objectives and questions effectively.

3.1.2. Approach

The procedures and planning related to gathering the information addressing research queries are called a research approach (Saunders, et al., 2019). The major approaches used in the research field include deductive approach, inductive approach, and abductive approach shown in Figure 9. The

inductive approach is narrowed down for this dissertation, Eriksson and Kovalainen (2016) argued that the inductive approach provides an opportunity to determine the why and how questions. The study is aimed to explore the development of the BI platform and its significance in effective decision-making for Dubai entities.

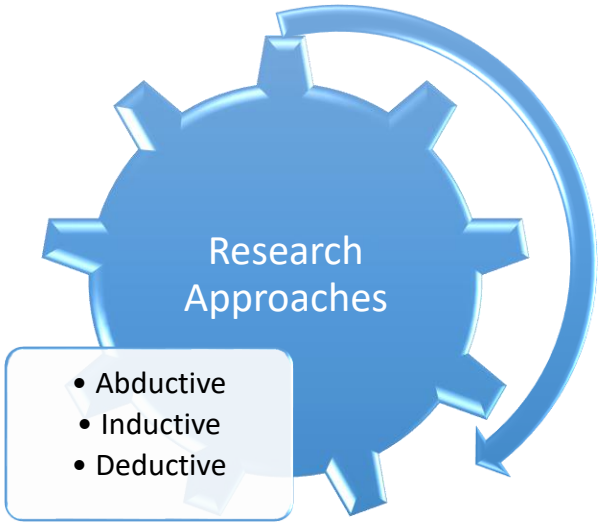

Figure 9: Research Approaches, Source: (Grover, 2015)

The inductive approach is suitable for studies that require a systematic gathering of information necessary to address the specific queries of the study and generate theories having a general focus as shown in Figure 10 (Grover, 2015). One of the benefits of using the inductive approach for the current study is that the researcher will use a flexible method to generate novel theories and gather information of the relevant context addressing the objectives, effectively (Azungah, 2018). Another reason for using the inductive approach is that an adequate understanding of how people react to their environment, and how they perceive different phenomena, is effectively demonstrated using this approach (Woiceshyn and Daellenbach, 2018). The secondary studies relevant to the problem area are assembled inductively to confirm that the questions are answered with an ample amount of insightful evidence.

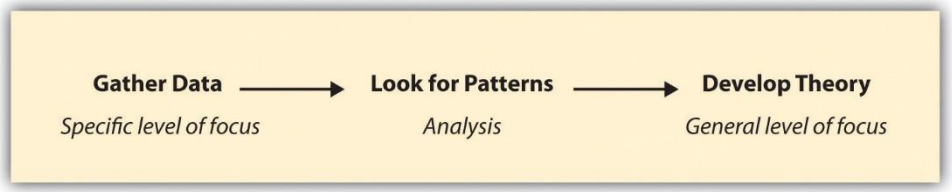

Figure 10: Inductive approach, Source: (Azungah, 2018)

3.1.3. Strategy

The overall procedure of conducting a research investigation and giving a suitable direction to the study is referred to as research strategy (Saunders, et al., 2019). The common strategies to achieve and provide an appropriate direction to the investigation include grounded theory, case study, action research, and survey strategy shown in Figure 11. The case strategy is used for detailed analysis and examination of one or multiple organisations, Zakauskas et al. (2018) stated that observations and analysis conducted via case studies transform raw data into interpretable and applicable information. The current study has gathered several qualitative information case studies and quantitative data from case studies to demonstrate the significance and development of using BI platforms for data-driven decision-making in Dubai Statistics Center. It should be noted that this investigation is based on secondary data, therefore, the case study strategy is useful to be aligned with the data gathering and analysis. As mentioned by Rashid et al. (2019), using a case study is beneficial for gathering rich and empirically tested data that is not effectively retrieved using other strategies. Furthermore, in-depth analysis and examination of a certain context allows explaining the relationship between multiple phenomena and provides flexibility to examine various aspects related to the case study.

Figure 11: Suitable Research Strategies, Source: [Self-made]

3.1.4. Data Collection

The process used by the researcher to prepare, gather and analyse the data is called the research design (Saunders and Townsend, 2018). Figure 8 shows the common research design such as a mono method using a qualitative, a mono method using quantitative design, etc. The research has employed pragmatism philosophy as the reality is best explained using both quantitative and qualitative explanation, therefore mixed-method research design is narrowed down. In the mixed methods research design, integration of both types of data such as fact-based and text-based data is performed. According to Techo (2016), a mixed-method design examines the contradiction of the qualitative and quantitative data and explains the reality by interpreting both types of explanation as conclusive evidence to address the problem area. It is mentioned that qualitative data is detailed and insightful therefore it is beneficial to retrieve novel information and generate theories to explain the different phenomena (Eisenhardt, et al., 2016). Whereas, quantitative data explains the reality with mathematical and factual evidence to support the socially integrated findings. Thus, mixed methods are employed to integrate both types of explanation to demonstrate the importance of BI platforms and their applicability in making data-driven decisions making.

3.1.5. Data Analysis

The procedure used for transforming, translating, and inspecting data is called data analysis (Saunders and Townsend, 2018). As mentioned before, the mixed methods design is employed for this investigation thus the data analysis techniques for both types of data are utilised. Since only secondary data is utilised for this study, the analysis of qualitative case studies is done using thematic analysis, and the quantitative case studies are analysed using statistical analysis. According to Kiger and Varpio (2020), thematic analysis is flexible and appropriate for determining meanings from the gathered information that helps the study to follow the direction of answering questions raised regarding the problem area. Chandrasekara (2019) argued that thematic analysis must be considered for data that requires the inclusion of context for rich interpretation and insights. Concerning the quantitative data, statistical analysis is among the most used analysis procedure; Bergin (2018) mentioned that identification of patterns, examining relationships, and generating descriptive statistics is included in statistical analysis. The data regarding BI platform implementation to facilitate data-driven decision-making practices was retrieved from qualitative and quantitative case studies. This data was analysed using the respective analysis techniques suitable for the type of collected data. The purpose of the analysis was to retrieve the information that can demonstrate the factors that impact the decision-making process of Dubai government entities when data-driven decisions are made. Furthermore, the supported data was examined using the analysis technique to establish the case for Dubai Statistics Center regarding BI platform implementation for data-driven decision-making.

3.1.6. Ethical Consideration

The secondary research design was employed, based on which the ethical considerations related to using secondary data are applicable. Weinbaum et al. (2019) argued that using secondary data requires proper citation to refer to the work and ideas generated by other authors and studies. Thus, the researcher in this investigation ensured that every information used by other studies is properly cited. Furthermore, the use of secondary data requires researchers to utilise data that was collected from different authors. Concerning this, Shesterinina (2019) argued that the secondary data should be carefully used such that the utilisation of data should not generate outcomes that may produce harm or distress to anyone. According to Jol and Stommel (2016), while using secondary data the

researchers ought to ensure that personal information is not included from the data collected by other authors. The current investigation gathered case studies only where the secondary data was utilised by focusing on data that is related to the problem area. Thus, ethical considerations were focused on by the investigator to generate bias-free outcomes producing beneficial insights for Dubai Statistics Center.

3.2. BI Development

Past studies have suggested that BI systems and platforms can be developed using several tools and software such as OLAP, Power Bi, etc (Marjamäki, 2017). The study by Westerlund and Persson (2015) used online analytical processing (OLAP) powered by IBM to develop a BI system and tested its effectiveness for decision-making in four enterprises. OLAP was found to be associated with the problem of information overloading in the case of Enterprise B. Monteiro (2021) used agile methodology for continuous improvement as opposed to the waterfall method that only goes forward in the implementation stages. Gudfinnsson et al. (2015) argued that agile methodology is better compared to the waterfall as it provides flexibility, adaptability, and susceptibility to errors to the implemented BI platform. Another study by BI Committee (2015) used Oracle for the development of the BI platform. The current study has employed ArcGIS, an online web-based mapping software, to gain insights and enhanced visualised details of the dataset for the case study of Dubai Statistics Center. To the best of my knowledge, this is the only study that has implemented the BI platform using ArcGIS software to facilitate the decision-making process in the Dubai Statistic Center. The details regarding the dataset, dataset preparation, and implementation details are provided below.

3.2.1. Dataset Information

In this dissertation, the dataset was downloaded from the official website of the Dubai Statistics Center (DSC, 2021). The dataset contained variables related to the population living in Dubai. A set of six datasets were used such as marriage contracts and divorce dataset, movement during peak hours in Dubai dataset, population by educational status and gender dataset, population by Gender dataset, and population in each area dataset.

- ***Marriage Contracts and Divorce***

The number of people in marriage contracts with emirates and non-emirates along with the divorce cases from 2018 to 2020 is shown in Table 2. The combination of the number of marriages with emirate husband and non-emirate wife and emirate wife with non-emirate husband is also shown separately. About 5,070 total marriage contracts were registered in 2020 compared to 4,444 in 2018. On the contrary, about 1,868 divorce cases were filed in 2020 compared to 2,029 in 2018. This data is very useful for the Dubai government to make changes to the existing policies of marriage and divorce contracts. However, the format of tables provides challenges in generating interpretation and implications for policy and practice. These are some of the instances from the total dataset to demonstrate the type of dataset that was used for the implementation of the BI platform using ArcGIS software.

Table 3: Marriage and Divorce cases by nationality, (Source: Dubai Statistics Center, 2020)

Title	2020	2019	2018
Marriage Contracts			
Emirati Husband - Emirati Wife	1,295	956	965
Emirati Husband - Non Emirati Wife	619	548	524
Non Emirati Husband - Emirati Wife	167	152	177
Non Emirati Husband - Non Emirati Wife	2,989	2,943	2,778
Total	**5,070**	**4,599**	**4,444**
Divorce Cases*			
Emirati Husband - Emirati Wife	358	397	413
Emirati Husband - Non Emirati Wife	172	174	200
Non Emirati Husband - Emirati Wife	87	62	54
Non Emirati Husband - Non Emirati Wife	1,251	1,096	1,362
Total	**1,868**	**1,729**	**2,029**

- ***Movement peak hours in Dubai***

The dataset included different dimensions and angles of population data, such as the total number of people living in Dubai along with people temporarily residing in the city from 2018 to 2020 a sample is shown in Table 3. These figures illustrate the active individual movement during the peak hours at the end of the year in Dubai for the years 2018 to 2020. It can be seen

in the table that figures indicate that the population is increasing for the population that is residing in Dubai. On the contrary, the population of workers that are temporary residents in Dubai dropped in 2020 compared to 2018. A total of 218,925 decreases is indicated by the recorded figures.

Table 4: Active Individual Movement in peak hours, Source: (Dubai Statistics Center, 2020

Title	2020	2019	2018
Population Usually Residing in Dubai	3,411,200	3,355,900	3,192,275
Workers Residing Outside Dubai and Temporary Residents**	1,009,170	1,196,000	1,190,000
Total	**4,420,370**	**4,551,900**	**4,382,275**

- ***Educational Status And Gender***

The data on the educational status of the population of Dubai is shown in Table 4. The data is organised in terms of illiteracy, literacy, intermediate degree, undergraduate degree and post-graduate degree along with a total of all the categories. The gender-wise demonstration of educational status is also provided by separating the number of males and females that lie in the respective categories. The significance of the BI platform is usually stressed with such complexity, a small sample of data is shown in Table 4 whereas the records could be endlessly producing a challenge for authorities. A quick overview of the tabulated data suggests that the total illiteracy rate increased by 2,348 in 2019 compared to 2005 and then decreased to reach 68,457 which is still not a significant drop compared to 2005 figures such as 71,274. However, the overviews of percentages portray a different picture, there was 5.89% illiteracy in 2005, which reduce to 2.24% illiteracy as per the total population. This suggests that the population is increasing in Dubai and thus the illiteracy percentages have shown a substantial decrease.

Nevertheless, the BI platform will allow the visualisation of this data along with the population data to allow the educational authorities to develop useful educational policies and build more schools. For instance, the literacy rate was about 12% of the total population in 2005 which has

also reduced to 6.76% in 2020 instead of increasing. This data is complex as possible causes behind the decrease in literacy cannot be predicted using these numbers alone. The data visualisation in the BI platform is thus suitable and effective to provide an inclusive view regarding these statistics and their possible connection with the number of schools or quality of education etc.

Table 5: Educational Status by Gender, Source: (Dubai Statistics Center, 2020)

2020				2019				2005*				الحالة التعليمية
%	المجموع Total	إناث Females	ذكور Males	%	المجموع Total	إناث Females	ذكور Males	%	المجموع Total	إناث Females	ذكور Males	Educational Status
2.24	68,457	15,462	52,995	2.44	73,622	16,552	57,070	5.89	71,274	10,144	61,130	أمي Illiterate
6.76	206,508	41,231	165,277	7.14	214,810	40,190	174,620	12.57	152,154	26,856	125,298	يقرأ ويكتب Literate
45.80	1,399,023	327,665	1,071,358	48.59	1,461,835	329,720	1,132,115	61.16	740,271	158,461	581,810	مؤهل متوسط Intermediate Degree
5.38	164,197	39,484	124,713	5.80	174,360	43,080	131,280	4.13	49,998	14,357	35,641	مؤهل دون الجامعي Under University Degree
39.82	1,216,209	449,698	766,511	36.03	1,083,835	425,865	657,970	16.25	196,741	68,624	128,117	مؤهل جامعي فما فوق University and Post Graduate Degree
100.00	3,054,394	873,540	2,180,854	100.00	3,008,462	855,407	2,153,055	100.00	1,210,438	278,442	931,996	المجموع Total

- ***Population By Gender***

The following data provides a dataset of the total population of Dubai from the year 1975 to 2020. This provides a broad view of the changes in the Dubai population. The males and females are also separately mentioned to provide a gender-based picture. It is observed that the total population for both genders has faced massive change as the number reached from 183,187 in 1975 to 3,411,200 in 2020. The number of females is way too less than the total number of males as per 2020 statistics. A sample of some of the records is shown in Table 6 displaying only recent years of population data separately noting the male and female progression in Dubai. The extended dataset of this table is shown in Appendix.

Table 6: Population by Gender in Dubai, Source: (Dubai Statistics Center, 2020)

المجموع Total	إناث Females	ذكور Males	السنوات Years
2,446,675	743,320	1,703,355	2015*
2,698,600	810,080	1,888,520	2016*
2,976,455	887,585	2,088,870	2017*
3,192,275	958,885	2,233,390	2018*
3,355,900	1,024,100	2,331,800	2019*
3,411,200	1,048,945	2,362,255	2020*

- ***Each Area Population***

Among the datasets, the population data based on the sector and community is the most complex. The communities are separated into sectors and codes are assigned for each community. Looking at these raw records and tabulated data does not provide a comprehensive interpretation and requires much time and effort for decision-makers to analyse the alternative options and make important decisions. Table 7 provides an overview of some of the population records based on sector and community. The population density and area-wise estimation are also shown in the table. The extended table of the population per sector or community is provided in the Appendix.

Table 7: Population by Sector and Community, Source: (Dubai Statistics Center, 2020)

Community Code	Sector & Community	الكثافة السكانية (فرد/كم^2) Population Density (person/km^2)	المساحة كم^2 Area km^2	مجموع السكان Total population	القطاع والمنطقة	رقم المنطقة
101	NAKHLAT DEIRA	0.0	99.8	2	نخلة ديرة	101
111	AL CORNICHE	3,207.8	0.6	1,961	الكورنيش	111
112	AL RASS	24,898.3	0.3	7,537	الرأس	112
113	AL DHAGAYA	90,526.3	0.2	15,985	الضغاية	113
114	AL BUTEEN	19,412.9	0.1	2,869	البطين	114
115	AL SABKHA	55,000.9	0.1	4,020	السبخة	115
116	AYAL NASIR	112,154.8	0.2	19,414	عيال ناصر	116
117	AL MURAR	101,175.9	0.4	39,227	المرر	117
118	NAIF	67,498.3	0.7	50,438	نايف	118
119	AL REGA	16,235.9	0.7	10,623	الرقة	119
121	CORNICHE DEIRA	16.1	0.9	14	كورنيش ديرة	121
122	AL BARAHA	24,344.5	1.0	24,961	البراحة	122

3.2.2. Implementation Details

The datasets were downloaded from the Dubai Statistics Center's official website in PDF format. The dataset is openly available on the website for implementation and analysis. First of all, the datasets were written and structured in the form of Excel sheets to make them usable and extendable. These excel sheets were then inserted into ArcGIS software and further entries were added to formulate the data. The dashboard of the generated Business Intelligence (BI) platform is demonstrated in Figure 12. It can be seen that the raw data that was taken as an input shown in the tables in the previous sections are effectively presented with visual and graphical components. The BI platform is providing an organised and structured format of data visualisation contribution to comprehensive insights and interpretation for decision making.

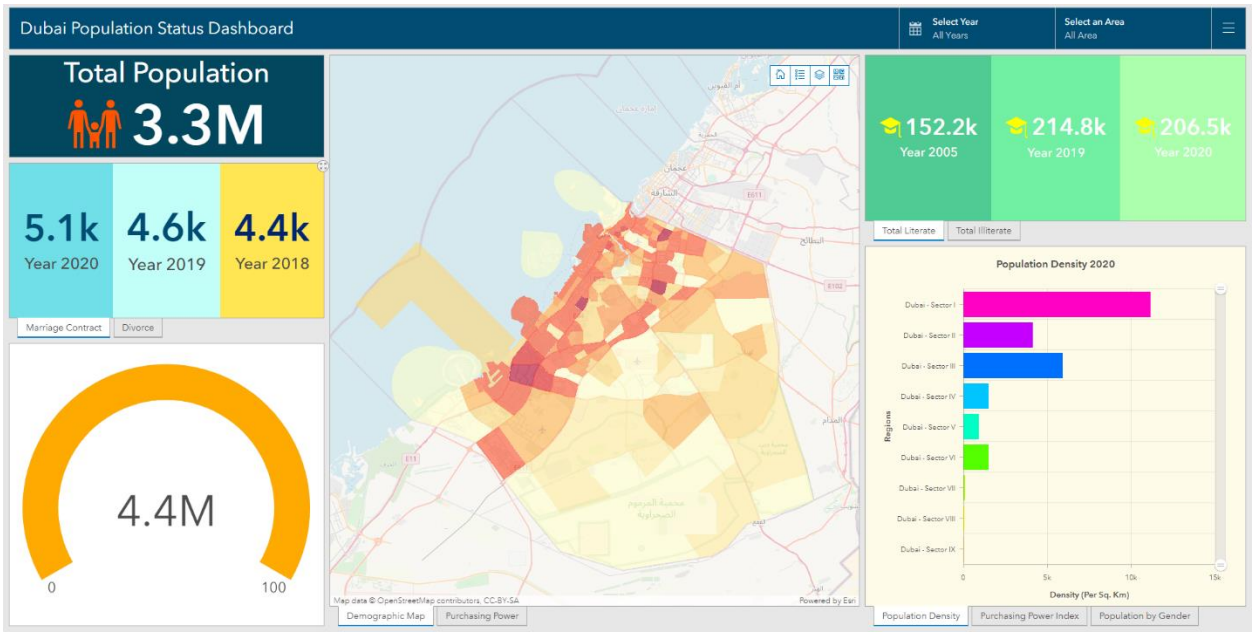

Figure 12: BI Platform Dashboard, Source: (Self-made)

The dashboard is providing an overview of the total population in Dubai such as 3.3 million. The population density is also visualised as shown on the right side of Figure 12. it is observed that Sector I has the maximum population and Sector V has the lowest population. The number of literate people in Dubai is also shown with the annual increase from 2005 to 2020. The number of marriage contracts is also shown from the years 2018 to 2020 such as 4.4K and 5.1K, respectively. With the mapping functionality in ArcGIS, the population of each community in all sectors is also

shown in the dashboard. In the current BI platform, six sectors are implemented and population statistics are displayed.

3.3. Chapter Summary

The chapter provides the methodological choices for the current study. The first section of the chapter provides the decisions made regarding methods and techniques used for the secondary research design. Pragmatism philosophy is selected as it provides a flexible approach to understanding reality based on qualitative and quantitative data. An inductive approach is selected as data is systematically gathered to develop theories. The case study strategy is employed because the case of the Dubai Statistics Center is taken into consideration. The ethical considerations of using secondary sources are ensured. The second section of the chapter is presenting the implementation details regarding the development of the BI platform. As Dubai Statistics Center is taken as a case study, the data was downloaded from its official website. The BI platform is developed using the dataset to demonstrate the significance of the BI platform in the decision-making process for Dubai government entities such as the Dubai Statistics Center.

CHAPTER 4

RESULTS ANALYSIS AND INTERPRETATION

4. Introduction

The chapter's purpose is to discuss and provide the details regarding data analysis and interpretation of results. Based on the chosen secondary design, the gathered data required analysis and interpretation for generating theories related to the problem area. Thus, thematic analysis was employed for interpreting the gathered data both qualitative and quantitative data were included. According to Williams and Moser (2019), thematic analysis is employed by assigning codes or keywords to determine patterns to form perceptive major themes that address specific research queries and objectives. The study explored the significance of BI platforms and their importance in aiding the decision-making process in Dubai Statistics Center and government entities. The secondary data was related to the major variables, the analysis revealed explanations and theories regarding the aspects of data-driven decision making and application of BI platforms. In addition to that, the development of a BI platform was performed concerning which the results and analysis are discussed in the latter part of the chapter. A summary concerning both parts such as secondary analysis and implementation results and analysis is provided towards the end.

4.1. Thematic Analysis of Secondary Data

4.1.1. Theme 1: Factors Affecting Decision-Making Process in Dubai Government Entities

Heyns and Mazzei (2015) stated that decisions were made based on data structured in the form of a balance sheet and the hypothetical interpretations of that data to decide how much profit could be gained. It is asserted that such structuring of data was useful for a small amount of data, as the world has progressed, entities began to shift to big and complex data for decision-making. There are however factors that influence the decision-making process in Dubai government entities. The decision-making process in Dubai government entities is centralised and less input is taken from all the stakeholders. Ali et al. (2020) explored the factors that may impact the overall decision-making process in the Dubai government entities. The factors are illustrated in Figure 13 below followed by a discussion of the determining factors.

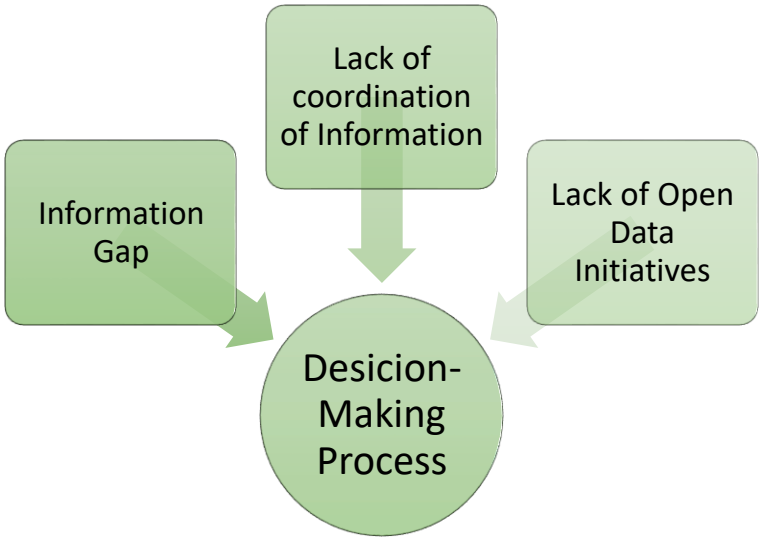

Figure 13: Factors impacting Decision-making, Source: (Self-made)

- ***Information Gap***

Although the world has shifted towards electronic data, there is a gap in terms of information when it comes to the decision-making process in Dubai government entities. The key players having the authority usually make the decisions relying on their 'gut feeling' or instincts instead of observing the facts and statistical data closely (Japheth et al., 2016). The study by Husin et al. (2017) mentioned that the information gap is among the issues that impact the decision-making process and slow the process of public service delivery. The substantial decisions for instance the decision regarding policies of divorces requires careful examination of statistics, interpretation, and associated complexity than just employing instincts. The information gap in Dubai government entities is not only limited to the availability of data but a shortage of past decision-making records. The information gap impacts the process of decision-making in terms of delayed decisions because of the lack of effective, quality, and timely data available for the decision-makers. Dalmau-Espert et al. (2016) noted that most decision-makers rely on a manual decision-making process as the available information is not in the forms of electronic data or digital data but pre-set data or manual reports. Ali et al. (2020) argued that government data is usually in an unstructured, heterogenous form where important semantics are missing and a clear interpretation of the information is not achieved. The decision-making process thus

suffers due to unstructured data which takes extra time to transform the data into an understandable and structured form. According to Engin and Treleaven (2019), the cause of the information gap is due to the lack of information sharing in the government entities.

- ***Lack of Coordination of Information***

Another factor that impacts the decision-making process is the lack of coordination among the data. As mentioned by (Ali, et al., 2020), public services delivery requires the resources of intergovernmental agencies and involved stakeholders. Thus, there should be coordination among the services provided by these Intra and inter agencies. The services involve multi-layers and must obey a standard process which leads to judgmental mistakes and irregularity in the policies and practice (Dzikrullah, et al., 2017). The lack of linkage between the services and disintegration of functionalities between agencies and ministries raises an issue leading to ineffective delivery of services (Anthopoulos, et al., 2016). This lack of coordination often leads to service delivery that produces conflict among the stakeholder's interests (Kuitert and Volker, 2015). Furthermore, this leads to a slow process of decision-making impacting the quality of the decisions and the associated practices of service delivery in governmental entities like DSC. Buranarach et al. (2018) stated that consistency and coordination among the standard operating procedures (SOPs) should be developed which is possible from clear coordination among the entities. In addition to coordination, the bureaucratic culture also delays the process of decision-making (Ahmad, 2017). The DSC must therefore apply the efficient approaches of decision-making to rapidly progress the process and enhance the quality of decisions. Roy (2017) argued that Dubai government agencies work in isolation from one another and are stored in propriety limiting their usage for the integration of data for various purposes.

- ***Lack of Open Data Initiatives***

A study suggested that Middle Eastern (ME) countries are far behind when it comes to data-driven governance (Zawya, 2021) The lack of open data worsens the issue of data shortage of big data in facilitating the decision-making process in Dubai Government entities. Although, Dubai is stated to be among the first cities in the MENA region to achieve a paperless government as of 2021 (Godinho, 2021), the problem of open data persists. The lack of open

data also worsens the issue of lack of integration because the agencies tend to keep the data private and restricted (Ahmad, 2017).

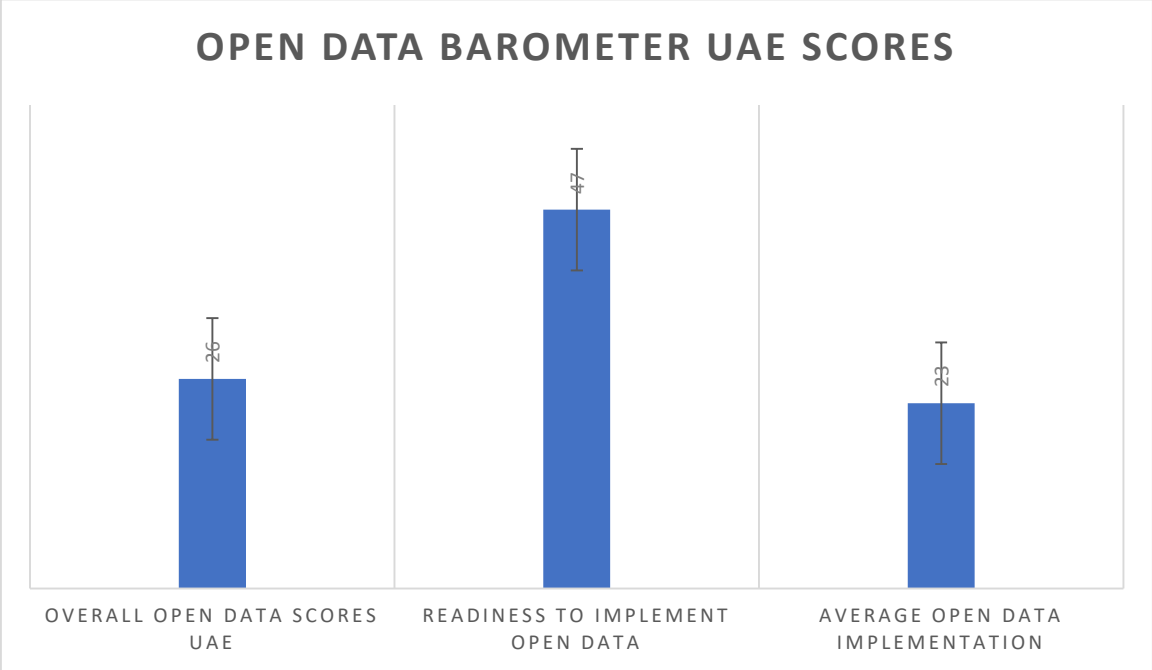

Figure 14: UAE scores in ODB, Source: (Open Data Barometer, 2016)

The Open Data Barometer measured country-wise progress regarding data analytics and found that the UAE scores 26/100 and show readiness to implement the open data initiative with 47/100 scores and score 23/100 on average implementation of open data initiatives for governance-related decisions (Open Data Barometer, 2016). The scores (Figure 14) indicate a lack of data-driven initiatives by government entities and the utilisation of data-driven activities in governance. Ali et al. (2020) stated that big open data is useful for providing insights to decision-making and receptive to policy making and demands of reality.

4.1.2. Theme 2: Significance of BI platform in Effective Decision-Making in Dubai Statistics Center

Gorgan (2015) stated that decision supports systems (DSS) are software-oriented programs that are suitable for business organisations, their implementation in governmental entities is debatable. The study by Alaskar and Efthimios (2015) stated that the BI platform is very useful as technological

advancements are hitting all sectors around the globe such as education, health, finance, banking, etc. The BI platforms are significant as they provide several advantages. Wieder and Ossimitz (2015) mentioned that the BI platform provides high quality of information and data that is necessary for effective decision-making. Qlik (2018) discussed that textual data is among the various sources of information which become very useful and comprehensive when integrated with BI solutions. Kababchieva (2015) noted that BI platforms are very easy to use and manipulate the data into bringing insights to the current situation of governmental actions and possible decisions that can be made. The BI platforms allow access to data for the implementation of various applications, the history of data and its usage is also useful for prospects in decision-making (Qlik, 2018). Based on the benefits described by various studies (Alaskar and Efthimios, 2015; Heang, 2017; El-Adaileh and Foster, 2019), the importance of BI platforms can be stressed due to factors demonstrated in Figure 15.

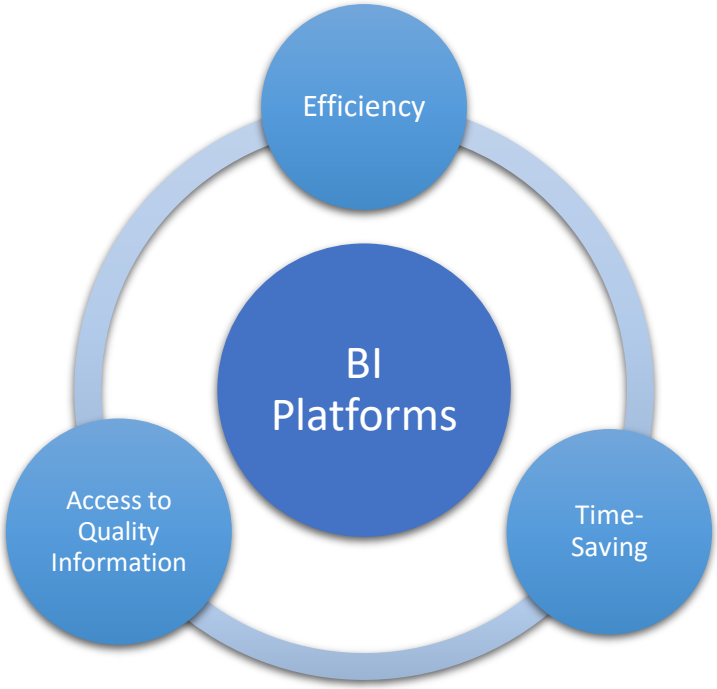

Figure 15: Factors of BI Platform Significance, Source:(Self-made)

- *Time-saving capability*

BI platforms provide a medium for rapid access of information and examination of information into knowledge that provides useful implications for policy-making and strategies (Smart City, 2017). The BI platforms provide data in a visualised and organised form with insights regarding other associated variables saving time and effort in the decision-making of governmental agencies. The unstructured data consumes extra time and effort and leads to a delayed process of ineffective decision-making as mentioned by Khan et al. (2017), this is intelligently and efficiently addressed by BI platforms that are effective and fast medium of data processing. The study by El-Khatib and Alzouebi (2021) explored the factors that can contribute to the smart city strategy of Dubai and highlighted the importance of BI platforms in providing fast delivery of data visualisation, assessment, and integration capabilities that aid decision-making and future development of a real-time database with BI systems. In this regard, Tongzhu et al. (2017) stated that BI collaboration in an organisation contributes to wide- analytical processing and reporting that accelerates the decision-making process in governmental entities. Dobrev and Hart (2015) mentioned that the BI platform helps the managers in acquiring continuous knowledge and information to assist decision-makers and progress rapidly to ensure efficiency and match the diverse changes.

- *Efficiency bringing aspects*

Gardner (2017) stated that with BI platforms the staff and officials in the government develop efficiency as the process is rapid and provides fast insights about relevant challeneges and concerns. Thus, Dubai entities can take advantage of efficient aspects of BI platforms for quality decision-making. The study by Gartner (2018) further explains that as soon as the right kind of information becomes available, the BI platforms allow the efficiency of accessing and visualising the data for extended interpretation and examination of its association with other variables for better decision-making in government entities. In this regard, King (2016) elaborated those decisions are improved due to efficient storing, visualising, analysing, and transformation of data from unstructured raw form into envisioned and organised information providing insights into the process. Furthermore, Avosys (2016) claimed that critical information is decoded from the entire value chain of information to provide the most relevant statistics and related interpretation leading to quality and efficient decision-making. This also

included retrieving information from big and complex data of governance and services given to the public in Dubai. Ziora (2015) determined that the significance of BI platforms in academic research is narrow and limited to business organisational context, this highlights the need for further research to produce perceptions for governmental entities.

- *Access to quality information*

Wieder and Ossimitz (2015) stated that enhancing the overall quality of the information is among the major purpose of BI platforms. Djerdjouri (2020) mentioned that information or data is among the new economic asset just like gold or currency. Figure 16 is provided below that demonstrates the rapid pace with which data and information is being created and increased over the years. The information is expected to reach 180 zettabytes, where 1 zettabyte = 270 bytes.

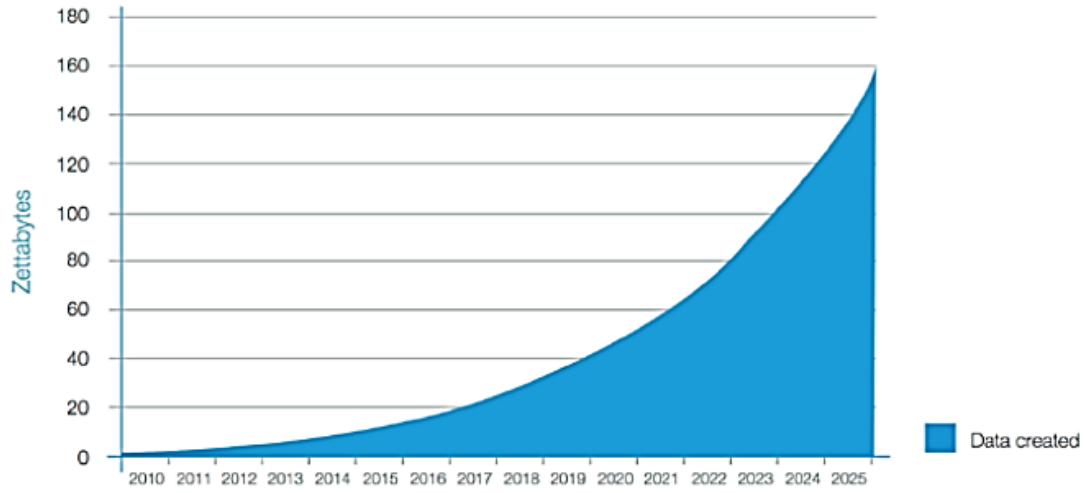

Figure 16: Data creation, Source: (Djerdjouri, 2020)

To survive in the competition, BI platforms are necessary to make use of quality information to facilitate decision-making before the competitive businesses achieve this. Mikalef et al. (2019) stated that BI users can be business or governmental entities that require rapid access to quality information for displaying and understanding the trends embedded in relevant data. Gartner (2019) mentioned that information-based decision-making is achieved using the BI platform as it provides

access to high-quality data due to which BI platforms have received increased attention in all sectors. Nerkar (2016) discussed that BI platforms have certain kinds of tools to analyse information and turn quality information into knowledge which is then transformed into an action plan after the decision-making process.

4.1.3. Theme 3: Evaluation and Recommendations regarding BI-platform based Decision-Making in Dubai Statistics Center

The study by Kranjac (2016) stated that dashboard functionality in the BI platform is proven to be an efficient graphic tool to understand the problem, the exact period when it started, and possible causes behind the problem. BI platform is thus evaluated to be an efficient tool and solution to the complexity of data that influence the decision-making process of Dubai government entities. Dinesh (2021) stated that BI platforms allow companies and organisations to make quality decisions by providing historical and present data in the relevant context with comprehensive visualisation. Needleman and Sternitzke (2018) stated that BI platforms allow entities in the Dubai government to take advantage of the massive amount of information in various ways which were not previously employed. However, the use of BI platforms puts a great responsibility in the hands of its user and stakeholders. A survey conducted on the participants of Dubai Police Entity explored the opinions concerning big data and its impact on the decision-making process in the governmental agencies. It was found that the quality of the data impacts directly the quality of the decisions. This provides implications for the Dubai government entities regarding the importance of the quality of the big data used in the decision-making process of Dubai government entities. Mugnaini and Fujino (2017) also stressed the importance of using quality and ample amount of data. Therefore, Dubai government entities should ensure the availability of data for effective decision-making.

4.2. Implementation Results and Analysis

The BI platform allows effective data visualisation that provides perceptions and insights useful in the decision-making process of Dubai governmental entities. As mentioned before, for this study, the case of the Dubai Statistics Center is taken into consideration. Therefore, different types of datasets were downloaded from its official website. The downloaded dataset was transformed into a usable format and using ArcGIS online software, the BI platform was implemented to visualise

data for DSC. The dashboard was used to access the data and display different aspects of the data to acquire information about different population-related variables. The implementation results are provided in this section, among several uses of this data, some of the key features and uses of the developed BI platform are presented below. Figure 12 shows a capture of the dashboard which is the most common feature of all BI platforms. Richardson et al. (2021) mentioned that dashboards in BI are customisable as per different requirements for which data is visusalised, the other features are discussed below.

4.2.1. Effective Data visualisation of raw unstructured data

The developed BI platforms are useful in providing data visualisation of big and complex data. For demonstration, consider the case of different communities and sectors. To analyse the population of different communities and sectors, excel sheets or tabulated data in PDF format are ineffective. The analysis of tabulated data is challenging in addition to being time-consuming and provides a limited interpretation of the data. On the contrary, using the BI platform dashboard the population and statistics of one community to another is easier and rapidly achieved. Figure 17 is shown below that shows a map in the middle whereas selecting the community on the map instantly displays the statistics details regarding the community, its names, and total population as shown in the figure. The selected community, highlighted in red color on the map, displays its name as Nadd Al Shiba First and has a population of 5,948 people.

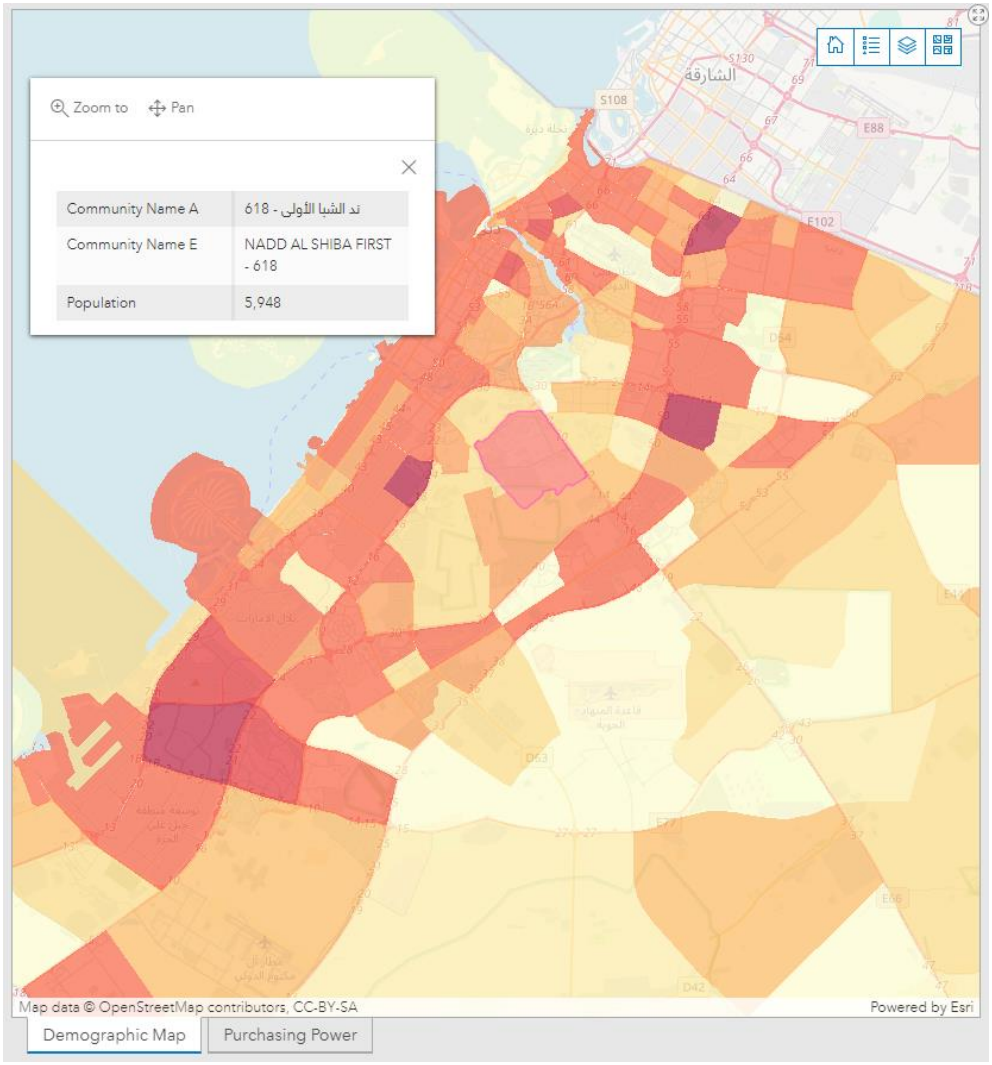

Figure 17: Population By community, Source: (Self-made)

Figure 18, on the contrary, is similarly shown with its name as Hadaeq Sheikh Mohammed Bin Rashid showing a population of 1,563. This visualisation of different sectors, communities, and population statistics can help the Dubai government in making decisions regarding building more schools in the sectors where the population has increased on yearly basis.

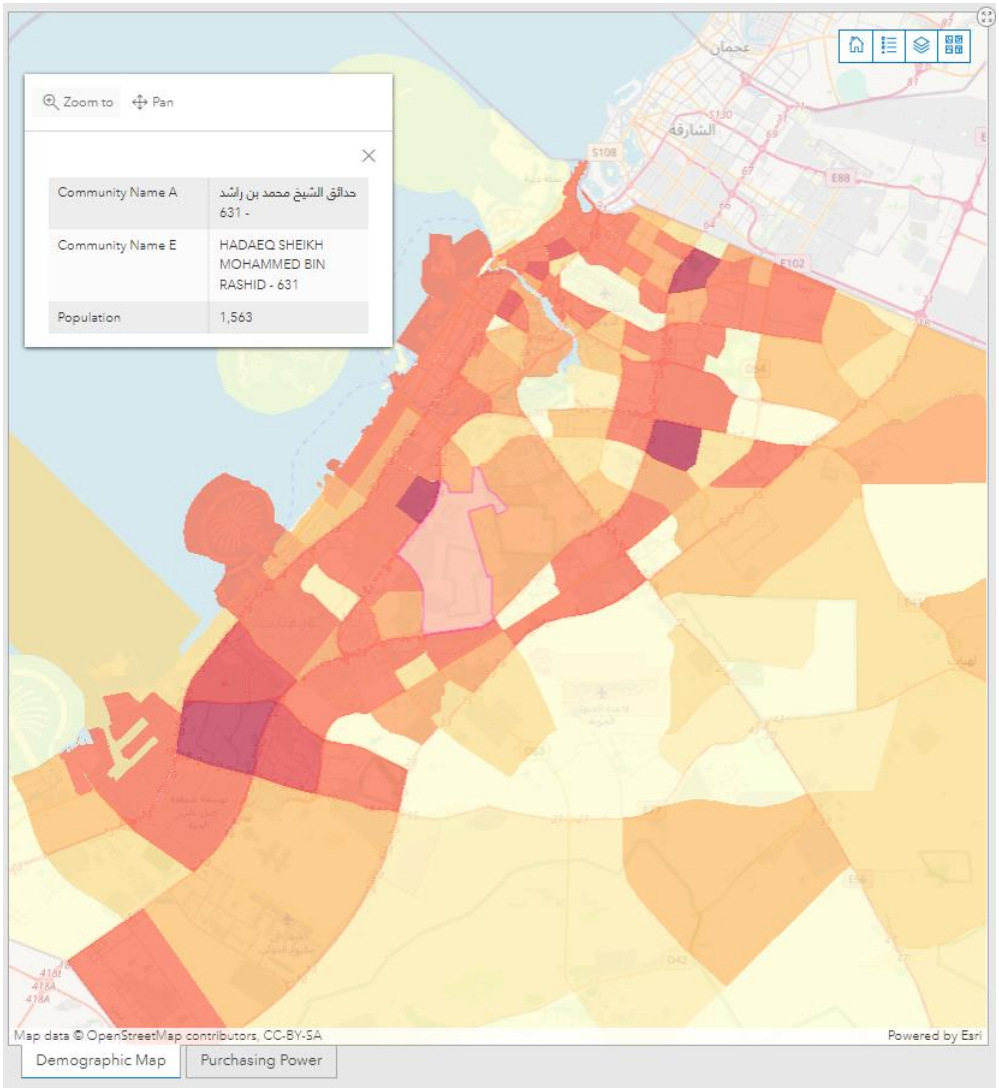

Figure 18: Area wise Population, Source: (Self-made)

The rapid access to quality information about the different communities in various sectors of Dubai allows the agencies to make numerous advantageous decisions that would lead to economic growth and rapid progression. For instance, the decision regarding making more tourist attractions in the city to the decision of building more parks in the cities with a high population to promote environmental health and sustainability along with economic prosperity in the UAE.

4.2.2. Dynamic View of Variables

The developed BI platform provides a fair share of data visualisation that aids in understanding the interaction between different variables. Figure 19 is included in the section to demonstrate how different aspects of the dataset can be visualised coherently to examine the correlation among the different variables of the dataset. The figure shows the statistics regarding the population increase in Dubai from 1975 till 2020. The data regarding population is displayed along with the gender-based population changes in the data from 1975 to 2020. It is observed that the population in terms of males gradually increased from 1975 with a high in 2005, another in 2010 and then in 2020. The female population has also increased but at a slower rate as compared to the male population. Looking at the data from this dynamic view provide insights regarding the imbalance between gender. Based on this, people can be encouraged to get married and have children to increase the likelihood of increasing the female population in Dubai.

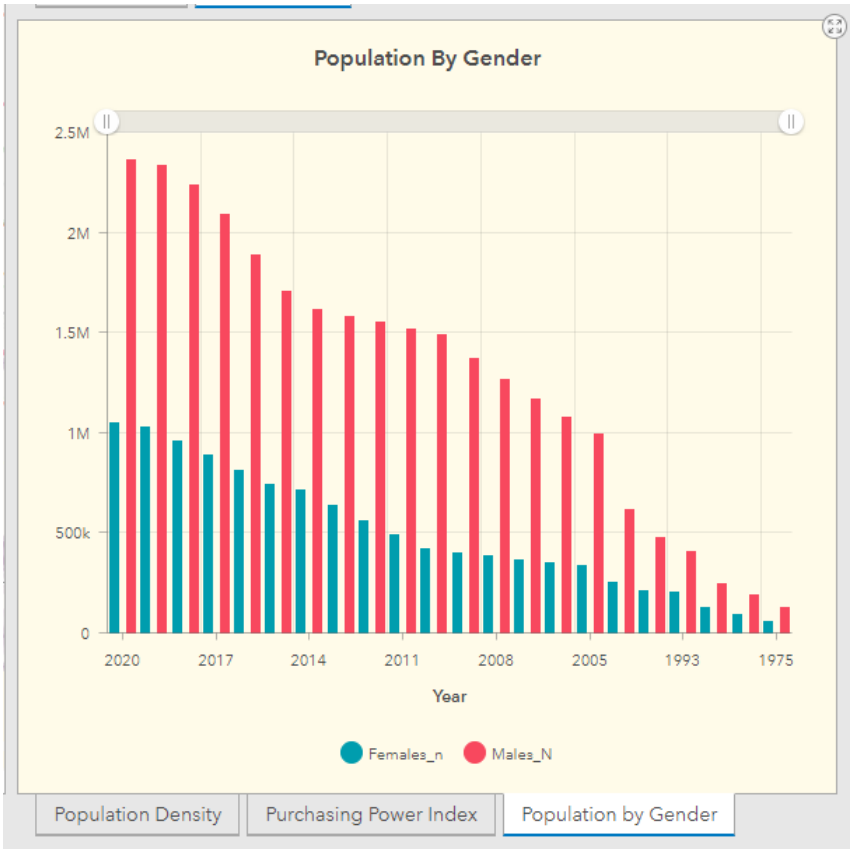

Figure 19: Population View by Gender, Source: (Self-made)

4.2.3. Faster Data mining

The developed BI platform provides fast data mining capabilities in addition to effective visualisation of big and complex leading to access to high-quality information. Figure 20 is shown below that demonstrates the density of the population in the different communities making up sectors. An overview of these sectors provides the big picture regarding the population in each sector and produces implications for sectors where the population is low to construct marriage-promoting policies. On the contrary, where the population is high, Dubai governmental entities can analyse different aspects and make decisions regarding building more schools, shopping malls, or starting an entrepreneurial venture.

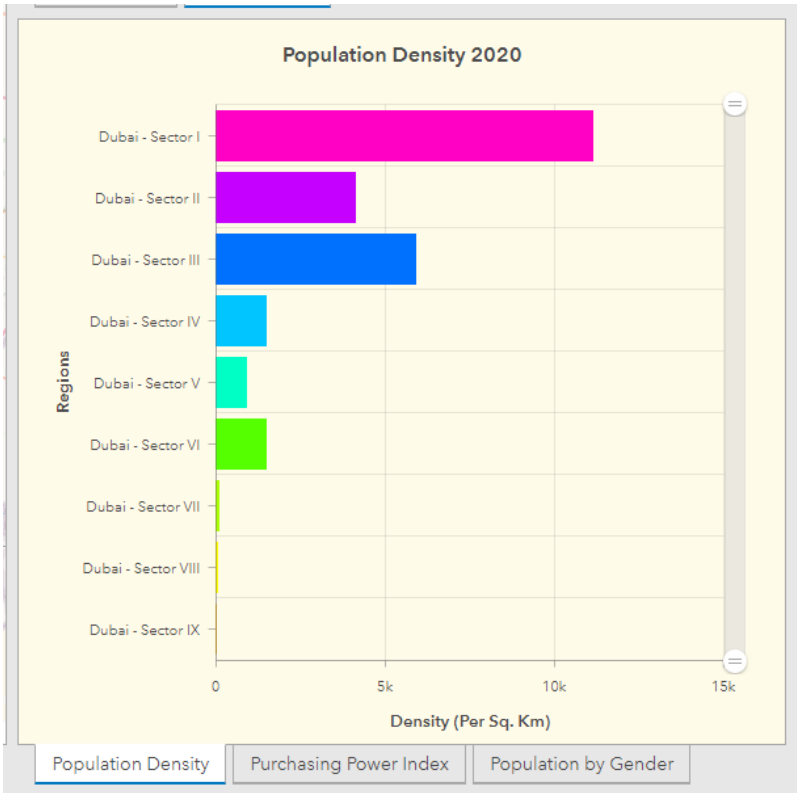

Figure 20: Sector-wise Population, Source: (Self-made)

4.3. Summary

This chapter overviews the thematic analysis of the secondary sources and the results obtained through the implementation of the BI platform aimed at improving the decision-making process of DSC. The first part of the chapter discusses three themes, each addressing the objectives of the study. It is analysed that the factors that affect decision-making include negligence towards data-

driven decision-making leading to an information gap, lack of information coordination among agencies, and a lack of open data initiatives. It is observed that the BI platform is useful for government agencies like DSC as it is time-saving, promotes efficiency, and provides access to high-quality information during decision-making. Moreover, the evaluation of BI platforms returns positive recommendations such as using a wide range of datasets and quality inputs and other recommendations related to the use of BI platforms in DSC. The second part provides implementation results in the form of figures displaying different aspects of BI platforms and visualisation of different aspects of the dataset downloaded from DSC. The features and associated uses specifically for Dubai government entities are also discussed.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5. Conclusions

The purpose of this report was to analyse the significance of the Business Intelligence (BI) platform in the decision-making process of Dubai government entities. To achieve the major purpose of the investigation, three objectives were formed aligning with the methodological choices of the research. The research viewed the reality and knowledge construction from a pragmatism perspective and thus selected pragmatism philosophy for obtaining knowledge regarding the research area. The pragmatism philosophical standing allowed the researcher to better understand the truth embedded in theories and shape the practical dimensions. In addition to that, the induction approach was selected with pragmatism to move from a specific complex problem of the importance of BI platforms to decision making in DSC to a general theory for understanding how BI platforms can facilitate the decision-making process in Dubai government entities. The research strategy such as a case study was selected for the study to assess the case of the Dubai statistics center (DSC). The case study was chosen as it allowed in-depth attainment of knowledge about DSC data and its use in the desicison-making process for Dubai government entities. Based on pragmatism, a mixed-method design was formed such as both qualitative and quantitative sources were analysed.

The study consists of two types of design and data collection methods. A secondary research design was opted based on which methodology was selected and both quantitative and qualitative sources were gathered for analysis. The formulated objectives aligned with the selected methodological choices. The secondary sources were gathered and analysed using thematic analysis. The first objective explored the different factors that impact the decision-making process in the Dubai government entities. It was examined that Dubai government entities have centralised structure when it comes to decision-making indicating that only the officials make decisions and input is not taken from other stakeholders like citizens, etc. The thematic analysis regarding this objective retrieved information that suggested the important factors influencing deciison0making are lack of

coordination of information, an information gap, and lack of open-data initiatives in the Dubai government agencies. It is concluded that the administration makes the decision based on intuition rather than engaging in data-driven decision-making leading to an information gap. Furthermore, a lack of coordination of information among agencies and a shortage of open-data initiatives by these agencies has worsened the problem.

The second objective was regarding the demonstration of the importance of BI platforms in effective decision-making for DSC and other government entities. It was examined that decision support systems (DSS) are used in business organisations for decision-making whereas its usage in government entities is debatable and often perceived as insufficient. The numerous benefits of the BI platform are discussed that addressed to meet the second objective of the investigation. It is assessed that BI platforms are useful and significant because of their time-saving capabilities, efficiency promoting features, and functionality providing fast access to quality information. The third objective is to evaluate and provide recommendations regarding the use of the BI platform in facilitating the decision-making process in Dubai government entities. It was found that dashboard functionality in the BI platform is a very efficient and effective graphic tool to examine the history and current status of a problem. Data visualisation in BI platforms can help the government entities in Dubai to reach a rapid decision based on data rather than assumptions. However, it is evaluated that using BI platforms also comes with few considerations for instance privacy and security of data as the responsibility is at the hands of its users. Furthermore, it recommended that the quality of data is very important as it influences the information visualised in the BI platform and consequently influences the quality of the decision. Thus, Dubai government entities like DSC must use high-quality data for the implementation of the BI platform. This shifts the direction of the study towards the second part of the research design such as the implementation of BI platforms by using datasets downloaded from DSC.

The study included the implementation of the BI platform to evaluate its importance and usage in the decision-making process of Dubai government entities like DSC. Therefore, a dataset was downloaded from the official website of DSC, this dataset was used for the development of a BI platform. For the development, ArcGIS was selected that shaped the data into an effective visualised format accessed through the dashboard functionality in the BI platform. The

implementation results and analysis suggested that the BI platform is significant as it allows effective data visualisation of raw and unstructured data. The data quality used for the implementation of BI platforms was optimal and aided the development of the platform for DSC. The results suggested that BI platforms allow a dynamic view of variables allowing the examination of different datasets and interaction between different variables. For instance, a dynamic view of population along with gender-based population increases provides a dynamic view regarding imbalance between female and male populations to generate recommendations for policy and practice. The BI platforms were also found to allow rapid data mining and easy user interface to visualise complex data such as display of information regarding population in each sector comprising multiple communities and population of each community respectively.

The ethical considerations of using secondary sources such as citing the material written by other authors properly and minimising bias in data interpretation were achieved. However, there are some limitations of the study. The secondary sources related to decision-making in Dubai government entities were lacking thus relevant information was used. Furthermore, the dataset used for the implementation of the BI platform was small and limited to demonstrate the significance of the BI platform at an initial level.

In conclusion, all three objectives of the study were successfully addressed whereas the major purpose of the study was also addressed using secondary research and implementation of BI platforms using ArcGIS web-based tool. It is found that BI platforms are significant and can impact the decision-making process in Dubai government entities like DSC. The BI platform provides easy functionality, a dynamic view of data, and rapid contact to information accessed through executive dashboard functionality in the BI platform. Furthermore, DSC can benefit from the time-saving factor and gain access to quality information for an effective decision-making process. The data-driven decision-making is found to be beneficial and important compared to low-quality decisions based on assumptions. DSC and other government entities are likely to benefit from the use of BI in the decision-making process keeping in mind that quality data should be used for the development of BI such as the one used in this study.

5.1. Recommendations

A secondary research design was commenced in addition to the implementation of a BI platform for DSC and other Dubai government entities. The secondary sources and BI implementation demonstrate the significance of BI platforms in the decision-making process of Dubai government entities. The recommendations regarding the study design, research area, and use of the BI platform in the decision-making process of Dubai government entities are provided below:

5.1.1. Primary Research Design

It is recommended that the current study should be extended to a primary research design such as a qualitative primary study, Ryan (2018) mentioned that qualitative design involves interpreting data obtained from human participants to reveal the information embedded in social interactions and experiences. Ajayi (2017) mentioned that primary data is unique and pure providing original interpretation and generalisable conclusions. Therefore, the study can use participants from DSC and employees working in other Dubai government entities to produce implications for improving the decision-making process.

5.1.2. Using Larger Dataset Or Big Data

The development of the current BI platform was done by using a dataset downloaded from the DSC website. A small dataset was used compared to big data which can provide a more comprehensive approach towards the development of the BI platform. Yeh et al. (2017) mentioned that policy-makers can make use of big data technologies to promote data-driven decision-making and address the cumulative needs of BI platforms. Furthermore, the study by Alkatheeri et al. (2019) suggested that data quality impacts the quality of decisions thus high quality and sufficient amount of data should be utilised for BI platform development. Therefore, one of the recommendations for improvements for the current investigation is to use a larger dataset for BI platform development facilitating decision-making in DSC and other government entities.

5.1.3. Open-Data Policy For Government Agencies In Dubai

Proper management of data and availability of open data is necessary through the life cycle of data governance for the facilitation of BI developments in the government sector (Ghavami, 2015). It is recommended that the Dubai government should implement policies related to open-data initiatives and regulate government agencies to coordinate information within them to reduce the information

gap. Wowczko (2016) mentioned that the effectiveness of open-data practices relies on relevant and effective policies for organisations and government agencies. Therefore, the policies regarding keeping the data open and shared among the government entities should be enforced across Dubai entities. furthermore, access to open government data can be useful for [private organisations to examine the current public sectors challenges and opportunities for new venture development. Open-data runs the ecosystem of knowledge and information sharing from which Dubai entities can benefit as the strategic decision-making require analysis of big and complex. A lack of availability can hinder the progress of data analytics and BI platforms. Thus, open-data policies and regulations are extremely necessary for effective decision-making and using the BI platform for strategic decisions.

5.1.4. *Data-Driven Decision Making Practices*

Although Dubai has achieved being a paperless government the practice of data-driven decision-making is lacking in general (Anthopoulos et al., 2016; Godinho, 2021). Japheth, et al. (2016)highlighted that decisions based on intuition lack supportive data and often lead to severe consequences for businesses and government agencies across the globe. An increased focus should be placed by the Dubai government to ensure decisions are taken based on data and BI platforms are effectively used for this purpose. OECD (2019) mentioned that good data governance is essential to achieve data-driven practices in government entities. thus, the priority should be to adopt quality data management to achieve good data governance and promote data-driven decision-making policies in all government entities. A data-driven culture can be encouraged by implementing and enforcing data-driven decision-making policies across various sectors in Dubai entities.

5.2. Future Work

The current study has developed a BI platform using ArcGIS platforms to facilitate the decision-making process in Dubai government entities like DSC. In addition to that, secondary research is conducted to demonstrate the significance of BI platforms and their uses in improving the quality of decisions in DSC. The recommendations are underlined in the previous section regarding the current design of research and using primary design for credibility and taking advantage of pure

data. Furthermore, a larger dataset can be used to increase the quality of the dataset and amount for the effective development of BI platforms. The future work regarding the current investigation is discussed as follows.

5.2.1. Integration with Real-Time Database

The study can be connected to a real-time database where information is concurrently and continuously updated for effective usage and generating insights for strategic decision-making. According to Djerdjouri (2020), the competitive and rapidly changing world today required the analysis of real-time data as the information is increasing day by day. The process of data interpretation, access to quality information, and strategic decision-making process can be enhanced and made efficient using the real-time database (Khan and Khan, 2016). Dubai government agencies like DSC can incorporate the BI system application and integration of real-time databases to ensure that data is processed, analysed, and visualised in real-time.

5.2.2. Integrating with Artificial Intelligence (AI) Approaches

Advanced technologies like AI are prevalently discussed in academic research for their flexibility, increased robustness, and predictive analytics. The AI-based BI platforms will provide the benefit of embedded analytics, increasing the effectiveness of useful insights, and aid human users to understand the data and how it can be translated to actionable solutions (Jain, et al., 2020). Dubai government entities can benefit from AI-based BI platforms which can be investigated as the future work of this study. Zohuri and Moghaddam (2020) stated that in today's competitive environment, the information is overloaded and voluminous thus requiring AI approaches to effectively analyse and visualise data in BI environments.

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7. APPENDIX:

a. Population By Gender (Extended)

السكان حسب الجنس - إمارة دبي

Population by Gender - Emirate of Dubai

جدول (01 - 01) Table

المجموع Total	إنـاث Females	ذكـور Males	السنـوات Years
183,187	54,366	128,821	**1975**
276,301	88,587	187,714	**1980**
370,788	123,609	247,179	**1985**
610,926	204,798	406,128	**1993**
689,420	211,211	478,209	**1995**
862,387	250,588	611,799	**2000**
1,321,453	332,148	989,305	**2005**
1,421,812	348,327	1,073,485	**2006***
1,529,792	365,216	1,164,576	**2007***
1,645,973	382,843	1,263,130	**2008***
1,770,978	401,238	1,369,740	**2009***
1,905,476	420,430	1,485,046	**2010***
2,003,170	487,400	1,515,770	**2011***
2,105,875	558,740	1,547,135	**2012***
2,213,845	634,700	1,579,145	**2013***
2,327,350	714,175	1,613,175	**2014***
2,446,675	743,320	1,703,355	**2015***
2,698,600	810,080	1,888,520	**2016***
2,976,455	887,585	2,088,870	**2017***
3,192,275	958,885	2,233,390	**2018***
3,355,900	1,024,100	2,331,800	**2019***
3,411,200	1,048,945	2,362,255	**2020***

* Estimated data for the number of population at the end of the year

Source: Dubai Statistics Center, Censuses of 1993 , 2000 , 2005 , Dubai Population Statistics 2016-2018

Ministry of Economy (Planning Previously) the Censuses of 1968 , 1975 , 1980 , 1985 , 1995

* بيان تقديري لعدد السكان في نهاية العام

المصدر : مركز دبي للإحصاء تعدادات أعوام 1993 ، 2000 ، 2005 ، الإحصاء السكاني لإمارة دبي 2016 -2018

وزارة الاقتصاد (التخطيط سابقاً) تعدادات أعوام 1968 ، 1975 ، 1980 ، 1985 ، 1995

b. Each Area Population (Extended)

توزيع السكان المقدر والكثافة السكانية (فرد/كم2) حسب القطاع والمنطقة - إمارة دبي

Distribution of Estimated Population & Population Density (person/km2) by Sector and Community - Emirate of Dubai

(2020)

جـدول (01 - 02) Table

Community Code	Sector & Community	الكثافة السكانية (فرد/كم^2) Population Density (person/km^2)	المساحة كم^2 Area km^2	مجموع السكان Total population	القطاع والمنطقة	رقم المنطقة
101	NAKHLAT DEIRA	0.0	99.8	2	نخلة ديرة	101
111	AL CORNICHE	3,207.8	0.6	1,961	الكورنيش	111
112	AL RASS	24,898.3	0.3	7,537	الرأس	112
113	AL DHAGAYA	90,526.3	0.2	15,985	الضغاية	113
114	AL BUTEEN	19,412.9	0.1	2,869	البطين	114
115	AL SABKHA	55,000.9	0.1	4,020	السبخة	115
116	AYAL NASIR	112,154.8	0.2	19,414	عيال ناصر	116
117	AL MURAR	101,175.9	0.4	39,227	المرر	117
118	NAIF	67,498.3	0.7	50,438	نايف	118
119	AL REGA	16,235.9	0.7	10,623	الرقة	119
121	CORNICHE DEIRA	16.1	0.9	14	كورنيش ديرة	121
122	AL BARAHA	24,344.5	1.0	24,961	البراحة	122
123	AL MUTEENA	41,786.4	1.1	46,510	المطينة	123
124	AL MURQABAT	46,571.4	1.5	70,112	المرقبات	124
125	REGA AL BUTEEN	8,946.4	0.8	7,216	رقة البطين	125
126	ABU HAIL	13,723.3	1.3	17,481	ابو هيل	126
127	HOR AL ANZ	47,714.2	1.8	83,529	هورالعنز	127
128	AL KHBEESI	1,643.4	1.2	2,016	الخبيصي	128
129	PORT SAEED	5,073.0	2.7	13,708	بور سعيد	129
131	AL HAMRIYA PORT	526.7	0.9	485	ميناء الحمرية	131
132	AL WAHEDA	14,673.8	1.4	21,018	الوحيدة	132
133	HOR AL ANZ EAST	15,559.7	1.4	21,430	هور العنز شرق	133
134	AL MAMZER	2,637.3	5.8	15,286	الممزر	134
	Sector 1	3,809.1	124.9	475,842	القطاع 1	
213	NAD SHAMMA	2,927.8	1.1	3,200	ند شما	213
214	AL GARHOUD	4,636.8	4.0	18,746	القرهود	214
215	UM RAMOOL	811.1	3.6	2,958	ام رمول	215
216	AL RASHIDIYA	7,745.2	4.8	37,493	الراشدية	216
221	DUBAI AIRPORT	1.6	14.2	22	مطار دبي الدولي	221
226	AL TWAR FIRST	4,558.1	2.6	11,687	الطوار الأولى	226
227	AL TWAR SECOND	4,419.0	1.1	4,909	الطوار الثانية	227
228	AL TWAR THIRD	3,652.0	3.0	10,837	الطوار الثالثة	228
231	AL NAHDA FIRST	18,762.8	1.7	31,828	النهدة الأولى	231
232	AL QUSAIS FIRST	16,917.9	2.7	46,210	القصيص الأولى	232
233	AL QUSAIS SECOND	7,064.6	1.8	12,654	القصيص الثانية	233
234	AL QUSAIS THIRD	3,216.3	2.3	7,263	القصيص الثالثة	234
241	AL NAHDA SECOND	28,353.6	2.2	62,706	النهدة الثانية	241
242	AL QUSAIS IND. FIRST	6,614.4	1.4	9,511	القصيص الصناعية الأولى	242
243	AL QUSAIS IND. SECOND	5,188.2	1.7	8,967	القصيص الصناعية الثانية	243

Community Code	Sector & Community	الكثافة السكانية (فرد/كم^2) Population Density (person/km^2)	المساحة كم^2 Area km^2	مجموع السكان Total population	القطاع والمنطقة	رقم المنطقة
244	MUHAISANAH THIRD	3,792.3	1.8	6,649	محيصنة الثالثة	244
245	MUHAISANAH FOURTH	15,097.1	2.3	35,083	محيصنة الرابعة	245
246	AL QUSAIS IND. THIRD	3,809.5	0.9	3,524	القصيص الصناعية الثالثة	246
247	AL QUSAIS IND. FOURTH	3,780.2	0.7	2,751	القصيص الصناعية الرابعة	247
248	AL QUSAIS IND FIFTH	849.1	2.4	2,034	القصيص الصناعية الخامسة	248
251	MURDAF	6,956.3	9.4	65,044	مردف	251
252	MUSHRAIF	6.4	10.5	67	مشرف	252
261	MUHAISANAH FIRST	1,665.5	5.0	8,283	محيصنة الأولى	261
262	AL MEZHAR FIRST	2,471.8	6.9	16,968	المزهر الأولى	262
263	AL MEZHAR SECOND	2,693.7	4.3	11,600	المزهر الثانية	263
264	MUHAISANAH SECOND	34,892.9	5.6	194,618	محيصنة الثانية	264
265	OUD AL MUTEEN FIRST	4,148.8	3.6	15,052	عود المطينة الأولى	265
266	OUD AL MUTEEN SECOND	2,327.2	2.4	5,647	عود المطينة الثانية	266
267	MUHAISANAH FIFTH	1.0	2.0	2	محصينة الخامسة	267
268	OUD AL MUTEEN THIRD	4,998.5	1.4	6,847	عود المطينة الثالثة	268
271	WADI ALAMRADI	142.7	24.2	3,451	وادي العمردي	271
281	AL KHAWANEEJ ONE	804.7	16.4	13,206	الخوانيج الأولى	281
282	AL KHAWANEEJ TWO	419.3	12.7	5,322	الخوانيج الثانية	282
283	AL AYAS	168.3	10.5	1,770	العياص	283
284	AL TTAY	245.9	3.3	810	الطي	284

	Sector 2	3,827.3	174.5	667,719	القطاع 2	
302	JUMEIRA BAY	39.4	1.0	39	شاطئ جميرا	302
303	WORLD ISLANDS	0.1	74.1	7	جزر العالم	303
304	JUMEIRA ISLAND 2	25.7	0.1	3	جزيرة جميرا 2	304
311	AL SHANDAGA	22.5	0.3	7	الشندغة	311
312	AL SUQ AL KABEER	58,624.3	0.9	51,293	السوق الكبير	312
313	AL HAMRIYA	44,705.8	0.8	37,012	الحمرية	313
314	UM HURAIR FIRST	6,042.4	1.0	5,950	ام هرير الأولى	314
315	UM HURAIR SECOND	1,593.7	3.4	5,414	ام هرير الثانية	315
316	AL RAFFA	38,795.4	1.2	47,652	الرفاعة	316
317	AL MANKHOOL	20,670.4	2.0	40,520	المنخول	317
318	AL KARAMA	35,862.0	2.1	75,560	الكرامة	318
319	OUD METHA	9,935.0	1.5	15,061	عود ميثاء	319
321	MADINAT DUBAI AL MELAHEYAH (AL MINA)	667.8	22.1	14,753	مدينه دبي الملاحيه (الميناء)	321
322	AL HUDAIBA	16,288.5	0.9	14,372	الحضيبة	322
323	AL JAFLIYA	14,544.1	1.7	24,281	الجافلية	323
324	AL KIFAF	2.5	0.8	2	الكفاف	324
325	ZAABEEL FIRST	808.5	4.1	3,331	زعبيل الأولى	325
326	AL JADAF	811.2	7.2	5,873	الجداف	326
332	JUMEIRA FIRST	2,079.7	10.0	20,715	جميرا الأولى	332
333	AL BADA	28,965.1	2.0	57,487	البدع	333
334	AL SATWA	14,592.9	2.7	39,297	السطوة	334
335	TRADE CENTER FIRST	20,043.7	0.8	16,734	المركز التجاري الأولى	335
336	TRADE CENTER SECOND	8,999.8	1.4	12,419	المركز التجاري الثانية	336
337	ZAABEEL SECOND	765.2	10.8	8,258	زعبيل الثانية	337

Community Code	Sector & Community	الكثافة السكانية (فرد/كم^2) Population Density (person/km^2)	المساحة كم^2 Area km^2	مجموع السكان Total population	القطاع والمنطقة	رقم المنطقة
342	JUMEIRA SECOND	3,046.4	3.4	10,284	جميرا الثانية	342
343	AL WASL	2,406.2	4.9	11,725	الوصل	343
345	BURJ KHALIFA	7,817.4	2.7	20,795	برج خليفة	345
346	AL KALIJ AL TEJARI	3,263.9	6.6	21,497	الخليج التجاري	346
347	AL MERKADH	140.7	10.4	1,457	المركاض	347
352	JUMEIRA THIRD	4,022.9	3.4	13,690	جميرا الثالثة	352
353	AL SAFFA FIRST	3,588.7	2.4	8,722	الصفا الأولى	353
354	AL GOZE FIRST	5,760.8	3.6	20,573	القوز الأولى	354
355	AL GOZE SECOND	1,005.5	5.3	5,354	القوز الثانية	355
356	UM SUQAIM FIRST	4,245.7	2.8	11,947	ام سقيم الأولى	356
357	AL SAFFA SECOND	3,604.7	1.9	6,823	الصفا الثانية	357
358	AL GOZE THIRD	16,737.7	2.4	40,556	القوز الثالثة	358
359	AL GOZE FOURTH	10,453.0	2.2	23,403	القوز الرابعة	359
362	UM SUQAIM SECOND	3,940.9	3.2	12,572	ام سقيم الثانية	362
363	AL MANARA	3,847.2	2.2	8,443	المنارة	363
364	AL GOZE IND. FIRST	5,359.1	4.8	25,860	القوز الصناعية الأولى	364
365	AL GOZE IND. SECOND	31,777.8	5.1	160,517	القوز الصناعية الثانية	365
366	UM SUQAIM THIRD	2,944.0	2.6	7,672	ام سقيم الثالثة	366
367	UM AL SHEIF	2,415.7	1.8	4,464	ام الشيف	367
368	AL GOZE IND. THIRD	5,792.5	4.4	25,504	القوز الصناعية الثالثة	368
369	AL GOZE IND. FOURTH	7,967.5	4.7	37,360	القوز الصناعية الرابعة	369
372	AL SAFOUH FIRST	769.1	5.9	4,516	الصفوح الأولى	372
373	AL BARSHAA FIRST	10,166.7	4.0	40,202	البرشاء الأولى	373
375	AL BARSHAA THIRD	3,021.6	4.9	14,947	البرشاء الثالثة	375
376	AL BAESHAA SECOND	2,480.1	6.4	15,901	البرشاء الثانية	376
381	NAKHLAT JUMEIRA	925.2	26.7	24,741	نخلة جميرا	381
382	AL SOFOUH SECOND	1,455.0	4.3	6,226	الصفوح الثانية	382
383	AL THANYAH FIRST (V. RABIE SAHRA'A)	23,559.4	1.1	25,202	الثنيه الأولى (قرية ربيع الصحراء)	383
384	AL THANYAH SECOND (JEBEL ALI HORSE RACING)	18.5	6.2	115	الثنيه الثانية (مضمار جبل علي)	384
388	AL THANYAH THIRD (EMIRATE HILLS SECOND)	5,665.4	3.8	21,769	الثنيه الثالثة (تلال الامارات الثانية)	388
392	MARSA DUBAI (AL MINA AL SEYAHI)	6,980.2	8.9	61,992	مرسى دبي (الميناء السياحي)	392
393	AL THANYAH FIFTH (EMIRATE HILLS FIRST)	4,239.7	9.7	41,185	الثنيه الخامسة (تلال الامارات الاولى)	393
394	AL THANYAH FOURTH (EMIRATE HILLS THIRD)	2,542.2	11.1	28,164	الثنيه الرابعة (تلال الامارات الثالثة)	394
	Sector 3	**3,858.2**	**326.6**	**1,260,218**	**القطاع 3**	
412	AL KHEERAN	801.4	6.3	5,060	الخيران	412
413	RAS AL KHOR	0.3	7.8	2	رأس الخور	413
415	AL KHAIRAN FIRST	129.1	7.3	947	الخيران الأولى	415
416	NAD AL HAMAR	1,753.0	8.3	14,571	ند الحمر	416
421	AL WARQAA FIRST	10,551.1	2.4	24,865	الورقاء الأولى	421
422	AL WARQAA SECOND	3,081.6	3.6	10,981	الورقاء الثانية	422
423	AL WARQAA THIRD	2,435.2	6.2	15,147	الورقاء الثالثة	423
424	AL WARQAA FOURTH	2,697.7	5.1	13,881	الورقاء الرابعة	424

Community Code	Sector & Community	الكثافة السكانية (فرد/كم^2) Population Density (person/km^2)	المساحة كم^2 Area km^2	مجموع السكان Total population	القطاع والمنطقة	رقم المنطقة
425	AL WARQAA FIFTH	0.0	4.3	0	الورقاء الخامسة	425
431	WADI ALSHABAK	0.3	10.5	3	وادي الشبك	431
Sector 4		1,382.1	61.8	85,457	القطاع 4	
501	NAKHLAT JABAL ALI	0.1	58.1	5	نخلة جبل علي	501
502	AL WAJEHAH AL BHARIYAH	0.0	124.7	4	الواجهة البحرية	502
511	HESSYAN FIRST	147.5	23.8	3,518	حصيان الاولى	511
512	HESSYAN SECOND	200.4	51.9	10,398	حصيان الثانية	512
513	SAIH SHUAIB 1	0.4	41.6	15	سيح شعيب 1	513
516	JABAL ALI INDUSTRIAL THIRD	82.1	30.0	2,462	جبل علي الصناعية الثالثة	516
518	JABAL ALI INDUSTRIAL SECOND	706.3	32.6	23,000	جبل علي الصناعية الثانية	518
521	MADINAT AL MATAAR	24.0	141.8	3,404	مدينة المطار	521
531	SAIH SHUAIB 2	651.3	22.3	14,511	سيح شعيب 2	531
532	SAIH SHUAIB 3	511.2	16.0	8,200	سيح شعيب 3	532
533	SAIH SHUAIB 4	576.7	19.4	11,170	سيح شعيب 4	533
591	JABAL ALI FIRST	3,564.8	21.3	76,016	جبل علي الأولى	591
592	JABAL ALI SECOND	310.9	5.1	1,573	جبل علي الثانية	592
593	JABAL ALI THIRD	4.1	365.0	1,513	جبل علي الثالثة	593
594	MENA JABAL ALI	711.6	34.8	24,795	ميناء جبل علي	594
597	DUBAI INVESTMENT PARK2	2,901.5	18.8	54,474	مجمع دبي للإستثمار الثاني	597
598	DUBAI INVESTMENT PARK1	4,026.2	17.2	69,117	مجمع دبي للإستثمارالاول	598
599	JABAL ALI INDUSTRIAL FIRST	6,697.3	22.1	147,777	جبل علي الصناعية الأولى	599
Sector 5		431.9	1,046.5	451,952	القطاع 5	
611	BU KADRA	1.1	1.7	2	بو كدرة	611
612	RAS AL KHOR IND. FIRST	969.2	2.6	2,564	رأس الخور الصناعية الأولى	612
613	RAS AL KHOR IND. SECOND	605.9	4.2	2,529	رأس الخور الصناعية الثانية	613
614	RAS AL KHOR IND. THIRD	4,103.9	5.4	22,358	رأس الخور الصناعية الثالثة	614
615	NAD AL SHIBBA SECOND	332.1	7.5	2,486	ند الشبا الثانية	615
616	NAD AL SHIBBA THIRD	173.7	6.3	1,098	ند الشبا الثالثة	616
617	NAD AL SHIBBA FOURTH	612.5	6.2	3,779	ند الشبا الرابعة	617
618	NAD AL SHIBBA FIRST	279.4	21.7	6,056	ند الشبا الأولى	618
621	WARSAN FIRST	12,650.6	8.4	106,601	ورسان الأولى	621
622	WARSAN SECOND	160.0	8.6	1,380	ورسان الثانية	622
624	WARSAN FOURTH	1,114.1	7.9	8,763	ورسان الرابعة	624
626	NADD HESSA	3,991.1	9.8	39,131	ند حصة	626
631	HADAEQ SHEIKH MOHAMMED BIN RASHID	43.6	38.7	1,688	حدائق الشيخ محمد بن راشد	631
643	WADI AL SAFA 2	1,013.9	10.5	10,678	وادي الصفا 2	643
645	WADI AL SAFA 3	328.1	30.2	9,906	وادي الصفا 3	645
646	WADI AL SAFA 4	23.3	6.9	160	وادي الصفا 4	646
648	WADI AL SAFA 5	1,319.6	16.3	21,536	وادي الصفا 5	648
664	WADI AL SAFA 6 (ARABIAN RANCHES)	2,369.6	7.8	18,511	وادي الصفا 6 (المرابع العربية)	664
665	WADI AL SAFA 7	1,024.4	8.4	8,613	وادي الصفا 7	665
671	AL BARSHA SOUTH FIRST	2,384.5	5.9	14,069	البرشاء جنوب الأولى	671
672	AL BARSHA SOUTH SECOND	1,607.0	4.8	7,661	البرشاء جنوب الثانية	672

Community Code	Sector & Community	الكثافة السكانية (فرد/كم^2) Population Density (person / km^2)	المساحة كم^2 Area km^2	مجموع السكان Total population	القطاع والمنطقة	رقم المنطقة
673	AL BARSHA SOUTH THIRD	1,876.0	3.7	7,023	البرشاء جنوب الثالثة	673
674	AL HEBIAH FIRST	2,577.9	4.2	10,767	الحبيه الأولى	674
675	AL HEBIAH SECOND	474.1	3.3	1,546	الحبيه الثانية	675
676	AL HEBIAH THIRD	1,615.6	4.3	6,955	الحبيه الثالثة	676
677	AL HEBIAH SIXTH	721.8	3.3	2,359	الحبيه السادسة	677
681	AL BARSHA SOUTH FOURTH	3,870.4	6.8	26,331	البرشاء جنوب الرابعة	681
682	AL HEBIAH FOURTH	2,287.0	9.1	20,916	الحبيه الرابعة	682
683	AL HEBIAH FIFTH	1,222.9	8.1	9,897	الحبيه الخامسة	683
684	AL BARSHA SOUTH FIFTH	2,543.2	3.0	7,506	البرشاء جنوب الخامسة	684
685	ME'AISEM FIRST	1,110.1	16.4	18,233	معيصم الأولى	685
686	ME'AISEM SECOND	1.2	10.4	12	معيصم الثانية	686
	Sector 6	**1,371.6**	**292.4**	**401,114**	**القطاع 6**	
711	AL AWEER ONE	108.6	39.7	4,312	العوير الأولى	711
721	AL AWEER TWO	103.9	54.9	5,710	العوير الثانية	721
724	ENKHALI	0.0	44.5	2	نخلي	724
727	AL WOHOOSH	1.7	26.5	46	الوحوش	727
731	LEHBAB FIRST	93.6	34.7	3,243	لهباب الأولى	731
735	AL MERYAL	49.2	15.5	760	المريال	735
736	NAZWAH	42.5	13.1	555	نزوه	736
	Sector 7	**63.9**	**228.8**	**14,628**	**القطاع 7**	
811	WARSAN THIRD	1,431.1	10.4	14,943	ورسان الثالثة	811
812	AL ROWAIYAH FIRST	274.3	11.5	3,152	الرويه الأولى	812
813	AL ROWAIYAH SECOND	0.0	7.5	0	الرويه الثانية	813
814	AL ROWAIYAH THIRD	74.9	60.0	4,494	الرويه الثالثة	814
821	MEREIYEEL	36.5	30.7	1,120	مريبل	821
824	UMM AL DAMAN	8.1	35.2	287	أم الدمن	824
826	LE HEMAIRA	1.5	36.4	53	الحميرا	826
831	LEHBAB SECOND	24.6	62.3	1,530	لهباب الثانية	831
835	UMM AL MO'MENEEN	9.5	32.7	310	أم المؤمنين	835
841	MARGHAM	6.7	152.6	1,023	مرغم	841
845	AL MAHA	4.7	41.7	195	المها	845
847	UMM ESELAY	5.9	35.2	206	أم السلي	847
851	REMAH	2.8	82.9	232	رماح	851
857	MARGAB	18.3	34.6	635	مرقب	857
861	YARAAH	1.2	76.5	95	يراح	861
891	HATTA	111.8	128.8	14,400	حتا	891
	Sector 8	**50.9**	**839.0**	**42,675**	**القطاع 8**	
911	UMM NAHAD FIRST	0.6	14.1	8	أم نهد الأولى	911
912	UMM NAHAD SECOND	0.2	8.5	2	أم نهد الثانية	912
913	UMM NAHAD THIRD	88.1	15.3	1,347	أم نهد الثالثة	913
914	UMM NAHAD FOURTH	0.1	46.0	4	أم نهد الرابعة	914
915	AL YUFRAH 1	23.0	17.5	403	اليفره 1	915
916	AL YUFRAH 2	198.1	4.3	858	اليفره 2	916
917	AL MARMOOM	3.5	27.3	96	المرموم	917
918	AL YUFRAH 3	64.0	11.1	711	اليفره 3	918

Community Code	Sector & Community	الكثافة السكانية (فرد/كم^2) Population Density (person/km^2)	المساحة كم^2 Area km^2	مجموع السكان Total population	القطاع والمنطقة	رقم المنطقة
919	AL YUFRAH 4	0.3	11.8	3	اليفره 4	919
921	AL YALAYIS 1	63.5	17.8	1,130	اليلايس 1	921
922	AL YALAYIS 2	96.2	14.3	1,380	اليلايس 2	922
923	AL YALAYIS 3	0.3	12.3	4	اليلايس 3	923
924	AL YALAYIS 4	0.6	13.2	8	اليلايس 4	924
925	AL YALAYIS 5	4.0	25.2	100	اليلايس 5	925
931	AL LESAILY	25.8	112.7	2,906	الليسيلي	931
941	GRAYTEESAH	0.6	91.8	55	قريطيسه	941
945	AL FAGAA'	3.0	140.5	425	الفقع	945
951	SAIH AL SALAM	6.9	88.7	608	سيح السلم	951
956	AL HATHMAH	0.4	82.3	35	الحثمة	956
961	AL SELAL	3.9	170.7	666	الصلال	961
967	GHADEER BARASHY	0.5	70.9	32	غدير براشي	967
971	SAIH AL DAHAL	0.0	190.2	3	سيح الدحل	971
975	AL O'SHOOSH	0.1	58.9	3	العشوش	975
978	SAIH SHUA'ALAH	0.0	69.5	3	سيح شعيله	978
981	MUGATRAH	5.8	139.9	805	مقطره	981
987	AL LAYAN 1	0.0	28.3	0	الليان 1	987
988	AL LAYAN 2	0.0	37.0	0	الليان 2	988
991	HEFAIR	0.0	143.6	0	حفير	991
Sector 9		7.0	1,663.9	11,595	القطاع 9	
Total		716.9	4,758.5	3,411,200	المجموع	

Source: Dubai Statistics Center

Yearly Population Estimates

Note: It should be noted that population estimates and forecasts give an estimated picture of the size of the population who are usual residents in the emirate during a given period of time, which is not fixed, excluding individuals with Dubai visas and living outside the emirate. Emiratis include those who have other emirates' passports and living as usual residents in Dubai.

المصدر: مركز دبي للإحصاء

التقديرات السكانية السنوية

ملاحظة: تجدر الإشارة إلى أن التقديرات والتنبؤات السكانية تعطي صورة تقديرية عن حجم السكان المقيمين إقامة معتادة في الإمارة خلال فترة زمنية معينة وهي غير ثابتة ولا يشمل الأفراد الصادرة لهم إقامات من إمارة دبي والقاطنين بالإمارات المجاورة أو خارج الدولة أي الإمارات الأخرى والمقيمين إقامة معتادة في إمارة دبي.