Data journalism practises in Gulf Cooperation Council (GCC) states

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Abstract

This study examined data journalism practises in four Gulf Cooperation Council (GCC) member states situated in the Middle East: Saudi Arabia, the United Arab Emirates (UAE), Oman and Bahrain. Though there have been several pieces of research regarding the emergence of data journalism across the globe, certain regions have remained unexamined, such as the Middle East. The absence of these regions from data journalism literature has resulted in a great demand to investigate data journalism practises outside Western countries (Fink and Anderson 2014; Stalph and Borges-Rey 2018; Appelgren, Lindén and van Dalen 2019), which this thesis was designed to address.

In order to analyse data journalism practises in these countries, the study was designed in two phases to cover observed forms and practices. The first phase evaluated forms of data journalism in the region by conducting a content analysis of data journalism stories from several news outlets. Phase two sought to understand the practices underpinning data journalism in these GCC countries to understand the characteristics that have emerged in the region. This was done through conducting a semi-structured interview with data journalists and/or the staff who were responsible for producing data journalism content.

Findings reveal that the data journalism content in the GCC tended to lack depth and rigour; this was indicted by the dominance of soft news content and the reliance on secondary data. However, it is worth noting that the purposes of the content analysis were to draw a picture of the data journalism content in the region, in order contextualise and inform the second phase of this research.

Interviews with data journalists and/or the staff who were responsible for producing data journalism content, revealed five types of challenges that face the data journalism practice in the GCC newsrooms. First, challenges regarding the journalistic role and newsrooms workflows. Second, challenges regarding data and its access related to data quality and usability. Third, institutional and governmental challenges. Last, challenges caused by economic pressure

In terms of data journalism practices, the research defined four taxonomies of data journalism practices in the studied newsrooms. The first taxonomy is data analyst-driven content (Makkah), the second is data analyst/designer driven content (Shabiba), the third is journalist-driven content (Alroeya) and the final taxonomy is external/internal content (Alwatan).

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Table Contents

List of Figures

List of Tables

1. Introduction

This research will study the data journalism practises in four of the Gulf Cooperation Council (GCC) member states: Saudi Arabia, United Arab Emiratis, Oman, and Bahrain. The sample of this study contain four newspapers and one news website for the content analysis, while it has four newsrooms' personal for the interviews. In order to contribute to this growing field of study on data journalism in newsrooms, the sample of this study will allow me to present a multi-country approach in order to understand how data journalism is being practised in the Gulf region and also how it has been affected by political and cultural factors. Furthermore, the proposed sample enables me to shed light on non-Western countries and how their newsrooms have coped with and adapted to the trend of data journalism. This research will utilise a multi-phase approach to examine data journalism practices in the GCC; the first phase will involve conducting a quantitative content analysis of data journalism contents of several news outlets in the region, to identify the current characterises of data journalism. The second phase will use a qualitative approach to investigate the practise of data journalism in newsrooms in four of GCC member states. It will utilise a semi-structured interviews technique to collect data from people working on data journalism projects in the selected newsrooms. This data collection will focus on examining the challenges that face data journalism practices, also to determine how data journalism is viewed, understood, and operationalised in these newsrooms. In addition, it will also define taxonomies and workflows of data journalism that exist in the GCC's newsrooms.

In recent years, data journalism has become a trend in journalistic practises. This trend has become so widespread that numerous newsrooms across the globe have introduced data journalism into their contents. As a result of this, there has been a plethora of new research published about new trend in journalism, how the concept of data journalism developed and its origins in other types of journalism. Academics assigned the development of the concept of data journalism with another journalistic technique: computer-assisted reporting (CAR). CAR is based on the utilisation of computers to process data in order to produce news stories (Cox 2000). Philip Meyer was one of the early pioneers in applying CAR in newsrooms when he employed social science methods to analyse and gather data via computers (Meyer 1991). On the other hand, there has been an upsurge in studies investigating how data journalism is being practised in newsrooms. These studies first started to appear in journals during the past five years and include Fink and Anderson's study on data journalism in the US (2014), Karlsen and Stavelin's investigation into computational journalism in Norwegian newsrooms (2013), Appelgren and Nygren's study about data journalism in Sweden (2014) and De Maeyer and colleagues' investigation regarding data journalism in Belgium (2014). These studies all explored how data journalism has been implemented and practised in their own respective country and focused on any obstacles or boundaries that data journalism encountered in that specific country. However, all the aforementioned studies were in the context of Western countries whilst utilising a cross-national sample. Fink and Anderson (2014) point out the absence of studies about the data journalism in the non-Western countries hinders scholars and researchers from providing a global comparative context of data journalism practises. Therefore, this research will study the data journalism practises in four of the Gulf Cooperation Council (GCC) member states: Saudi Arabia, United Arab Emiratis, Oman, and Bahrain.

To understand data journalism practice in the GCC, it is imperative to take a macro approach of how the GCC's media system fit in the extensive body of scholarships regarding media system theories. Therefore, there is a need to account for the history and development of media system theories. Likewise, this is necessary because these theories have the tendency to classify media systems from a Western perspective. The Western-centric approach is one of the main critiques media system theories have faced since their inception; this, in turn has hindered these theories from becoming universal typologies and classifications. However, there were several attempts to classify media system in the Middle East: one of the leading typologies was Rugh's typology (2004) of Arab media system, other typologies have also been put forward by researchers such as Ayish (2002) and Elareshi (2012). Nonetheless, these classifications were criticised for two primary reasons; being inspired by Western theories and their shortcoming to cover novel forms of media.

These classifications have common flaws, their inapplicability outside their respective area of study, and their failure to account for new forms of media. Scholars criticised these theories arguing that future development must consider the differences between countries and should evaluate each country separately (Mellor 2005). Mellor (2005) continued to state that future studies should include new forms of media and account for modern news production (Norris, 2009; Hardy, 2012; Brüggemann, 2014).

In the context of this research, although Rugh's typology classifies media system in the Arab countries, his typology tends to be oversimplified and generalised. This has caused several factors that distinguish the GCC countries from the rest of the Arab world to be neglected. For instance, the governmental system in the GCC is unique when compared to other parts of the Arab world. Furthermore, the GCC countries benefit from world-class IT infrastructure, unlike their non-GCC Arab counterparts (Ayish 2017).

Likewise, the shortcoming of media system theories in considering new forms of media has resulted in the lack of empirical research capturing new forms of media, such as data journalism. This has led to the absence of data journalism studies in the non-Western context. As a result of this, academics have been prevented from providing research historicising the role of data journalism in media systems and newsroom practices on a global comparative scale. This was a concern raised in Fink and Anderson's (2014) study into data journalism in the USA.

Consequently, this research has sought to address this void in the body of research by studying data journalism practise in a non-Western context, while highlighting the shortcomings of media system theories in examining systems outside of the Western hemisphere.

1.1. Research Aim, Objectives, and Questions

1.1.1. Research Aim

The aim of this study is to investigate the data journalism practises in four of the GCC's member states (Saudi Arabia, United Arab Emiratis, Oman, and Bahrain), focusing on the boundaries and challenges that face data journalism in their newsrooms. Moreover, this study aims to explore how data journalism is viewed, understood, and operationalised within newsrooms in these four countries, while concentrating on other aspects that may affect data journalism practises, such as the political context. Finally, this research aims to define any data journalism taxonomies or workflows that exist in the Gulf region.

1.1.2. Research Objectives

- Critically review literature to identify how media system have developed, in order to understand the difference between the Western and non-Western systems. In addition, to examine the history and development of media in the context of four GCC member states (Saudi Arabia, United Arab Emiratis, Oman, and Bahrain) and the factors that impact journalism practices in the region.
- Identifying the history of data journalism and how it has evolved through the years, while highlighting the challenges that faces this type of journalism.
- To investigate the current situation of data journalism in the Gulf region. This research will evaluate the content of several news outlets in the area to identify how data journalism is being practised. It will be a simple content analysis to provide a snapshot of the current data journalism practices in GCC newsrooms.

- To highlight challenges facing data journalism in four of the GCC member states and how the newsrooms deal with them.
- To provide and in-depth insight on how journalists in the Gulf understand data journalism and how data journalism has been operationalised in their newsrooms.
- Dentifying any existing data journalism's taxonomies and workflows in four of the GCC member states.

1.1.3. Research Questions

1. What are the characterises of data journalism contents in the Gulf Cooperation Council (GCC) states of Saudi Arabia, United Arab Emiratis, Oman, and Bahrain?
2. What are the forms and practices of data journalism in these GCC states?
3. How is data journalism viewed, understood, and operationalised within these GCC newsrooms?

These questions will be answered by utilising two approaches; the RQ 1 will be investigated using a quantitative content analysis of data journalism content that was published in the selected timeframe. The purpose of the content analysis is to contextualise and inform the second phase of the research, it will be a simple content analysis that highlights how data journalism in being practised in the region. It will not provide an in-depth picture of data journalism content, but rather it will provide a snapshot of data journalism content in several news outlets in the GCC.

In contrast, RQ 2 & 3 will be answered via a qualitative approach that allows me to capture in-depth and rich data related to data journalism practices in the region.

1.2. The research rationale

The spread of data journalism practises has coincided with a great amount of data journalism research, which examines every aspect of data journalism from its development to the product. However, these scholarships tend to focus on Western-centric practises, which are usually based on Western fundamentals, such as transparency and freedom of information. These fundamentals consequently impose analytical difficulties when attempting to study data journalism beyond the Western context.

Being a GCC citizen and having worked and taught in the journalism field in the region has helped motivate me to study data journalism in a non-Western context. I have a first-hand experience of how newsrooms operate in the region, and how students are prepared to become newsroom staff. Alongside this, my master's degree, where I focused on personalisation in data journalism content in the New York Times and The Guardian, helped develop an interest in data journalism. Moreover, during my master's degree I was trained in data journalism by one of the news websites operating in the region. During this training I gained invaluable experience into how data journalism was being practiced in the GCC's newsrooms. Additionally, I have a desire to gain the necessary knowledge and experience in data journalism to benefit my fellow GCC's journalists and students. I also hope that this research will allow newsrooms, journalists, and students to improve their understanding of data journalism, eventually leading to mainstream adaption and ensuring the maturity of data journalism practices in the GCC.

From my experience working in GCC journalism, I identified a knowledge gap, namely the lack of data journalism studies outside the Western context. In particular, there is a lack of data journalism research in the Middle Eastern context and merely a few published articles exist discussing data journalism in this context (Lewis and Nashmi 2019; Fahmy and Attia 2020). Furthermore, Fink and Anderson (2014) encourage scholars to study the role of data journalism outside Western countries, in order to identify and compare different understanding and practices of data journalism.

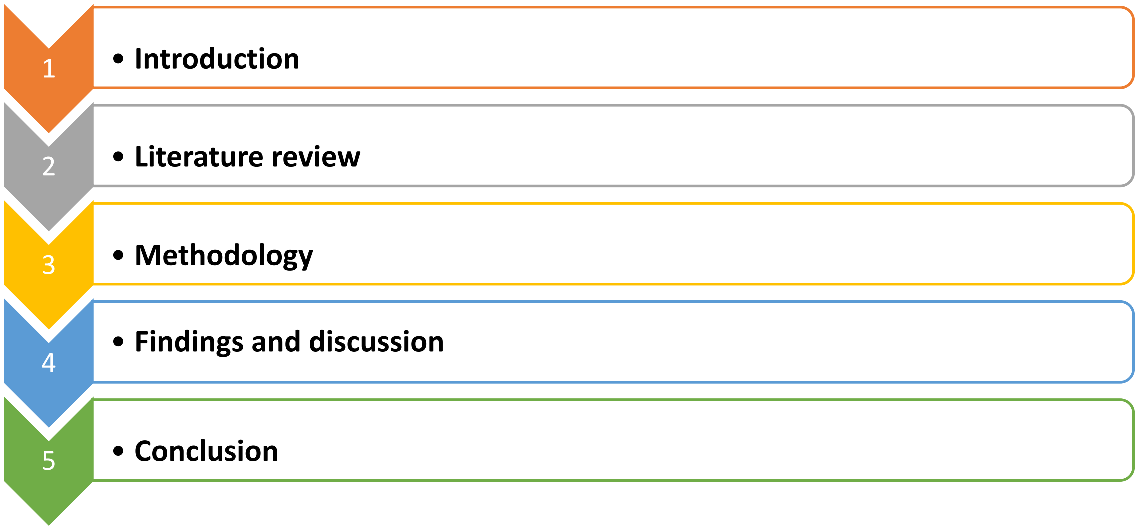
As a result of this, I opted to study data journalism practices in the GCC; one of regions that remains relatively unexamined. The four (Saudi Arabia, United Arab Emiratis, Oman, and Bahrain) GCC member states were selected for the following reasons: first, the size of the Middle East makes it difficult to study data journalism practices in depth over such a vast area. Second, the political and cultural factors vary from country to country in the Middle East. Therefore, I chose the GCC since these countries share more than one common characteristic such as having political and cultural similarities (Metz 1994). Third, the media system in the GCC states is a unique system and one which is considered as a loyalist system that relies on government subsidies as a source of income (Rugh 2004). Finally, the relatively close location of the chosen GCC countries made them a viable choice to conduct a fieldwork trip, allowing me to visit all the newsrooms that will be studied over the course of the research.

This study of data journalism practices in the GCC will addresses the identified knowledge gap since it will examine an area that has never before been studied. Furthermore, it will shed light on how different media systems, in particular outside Western countries, impact data journalism practices and how these practices coexist despite the lack of Western values that were factors contributing to the prominence of data journalism. In addition, it will identify different understandings and practices of data journalism, while highlighting any common aspects shared with data journalism in the Western context.

In terms of the importance of this study to the industry, this research aims to present a data journalism practice model that takes into consideration the capabilities of newsrooms in the GCC such as the limitation of staff and tools. Furthermore, it will shed light on the difficulties that arise when data journalism is adopted, while providing an insight about how their Western counterparts have dealt with these issues.

1.3. Structure of the thesis

This thesis consists of five chapters, these chapters are described in sequential order.



Chapter one (this chapter) will be an introductory chapter to the research, introducing the thesis by identifying the background of the research and its aims, objectives, and research questions. It will also highlight the importance of the research and the rational for conducting this research, while emphasising the importance of the research on knowledge of the journalism industry.

Chapter two will provide contextual content for the research by reviewing the existing literature related to the history and development of media systems, its theories and how the GCC context fits within these theories. It will also provide a historical evaluation of journalism in the GCC region, focusing on factors that impact journalism practice in the region. It will review the context of data journalism by discussing its origin and definition. Lastly, it will examine its role in the newsrooms.

Chapter three will present the methodological choice of this research; this includes the research methodology and design, which apply a multi-phase approach quantitative (content analysis) and qualitative (interviews) to examine data journalism practices in the GCC. It will also highlight the selected techniques that will be utilised to collect and analyse the data of the research.

Chapter four will present the research's findings, including the findings of the two phases of the research. In the findings of the first phase, I will display the results of the quantitative content analysis of the data journalism content of several news platforms in the GCC, which focus on several aspects such as the source of information and data visualisation. Likewise, this chapter will also present the findings of phase two of the research, which is based on semi-structured interviews with newsroom personnel working on data journalism projects. The findings include four existing taxonomies and workflows of data journalism productions in the newsrooms studied, also it includes several challenges that data journalism production encounters; some of them are common challenges and whilst others are unique to the context of the GCC. Finally, this chapter will link the findings of the research to the existing body of data journalism scholarship, while discussing the benefits and drawbacks of the existing taxonomies in order to establish a data journalism practice model that is applicable to newsrooms in the GCC.

Chapter five will conclude the research by presenting its contribution to knowledge and practice, highlighting its recommendations and the venues for future work. It will also draw attention to the limitations of the research and provide a summary of the content of the research.

2. Literature review

This chapter will review the literature related to the history and development of media systems and its theories, while comparing media systems in Western and non-Western context. It will also discuss the existing media system typologies in the context of the Middle East, emphasising its limitations and its Western-centrism tendency. Moreover, it will establish how the GCC countries fit into these typologies, so that it can be understood how media systems in the GCC function within their current political framework. In addition, this chapter will discuss the history and development of media and journalism in the region, while identifying the factors that impact journalism practises in these countries.

Moreover, it will review the current debates in relation to data journalism with focus on its origin and means of development. It will also provide an insight into the concept of data journalism and how the news industry reacted to its emergence. In addition, it will review several aspects of data journalism, in order to draw a clearer picture of this fast-growing type of journalism. Additionally, it will highlight the existing challenges and boundaries that affect the practice of data journalism globally and provide an insight into the ethical issues surrounding data journalism. Lastly, it will discuss data journalism in the GCC context, while emphasising the challenges that face data journalism in non-Western contexts either in conceptual or practical level.

This chapter will discuss the debates surrounding the history and development of media systems theories, focusing on the normative approach starting with the "Four Theories of the Press" by Fred S. Siebert, Theodore Peterson, and Wilbur Schramm (1978). Following this, the Daniel Hallin and Paolo Mancini (2004) taxonomies of media systems and Rugh's (2004) classification of Arab media systems will be discussed. This chapter will also highlight the criticisms regarding these theories, while emphasising the scholarly attempts to develop more suited taxonomy for media systems in the Arab world.

Also, it will provide an overview of the Gulf Cooperation Council (GCC) and the conditions that led to its establishment, while focusing on its political and economic status. It will also discuss media development in the GCC, in addition to the history of journalism and the development of each of the four countries that are included in this research. Furthermore, in order to understand how journalism practices have been shaped as we know them today, this chapter will discuss journalism in the GCC in the context of media system theories.

Next, this chapter will go on to highlight the framework of this study (hierarchy of influences) by providing a definition and referring to its layers. Also, it will shed light on its theoretical aspects, while discussing its criticisms and my justification for selecting it. This chapter will also deliberate the factors impacting journalism practises in the GCC, utilising the hierarchy of influences as a starting point. These impacts include political, economic, organisational, and professional impacts, each impact will be described in detail in order to pave the way for understanding the circumstances surrounding journalism practices in the region.

Also, this chapter will discuss the current debates surrounding data journalism, addressing its development while shedding light on its relation to other journalistic aspects such as computer-assisted reporting (CAR) and computational journalism (CJ). In addition, it will highlight some epistemological ambiguity regarding data journalism and how this affects this field of journalism. Following this, this chapter will define data journalism, highlighting the scholarly dispute regarding its definition. It will also discuss the role of data journalism in newsrooms and how its introduction has altered the newsrooms. Also, it will explain the forms of data journalism, its approaches and its integration into newsrooms, while emphasising on factors that have caused its popularity. Next, this chapter will discuss the challenges that face data journalism practises and how these challenges impact data journalism practises and its adoption. Finally, the discussion will move to data journalism in the context of the four GCC member states, while pointing out the issues that impact on the emergence of data journalism outside Western countries.

2.1. History of media systems theories

Media scholars tend to invest vast amounts of knowledge and scholarships on media system theories, in order to track the change in newsrooms and the impact of new technology in news making. Research related to media system theories enable scholars to identify how media systems developed and what were the conditions that affected this development. Furthermore, it provides an insight into how news organisations react in different setting, while identifying the reasons behind their behaviour.

In addition to this, it is critical to note that there are no universal media systems, which can be applicable to different parts of the world. Thus, each region needs to be examined in a separate manner, so that we can fully understand the developments that occur. For instance, Daniel Hallin and Paolo Mancini (2004) developed media systems of 18 countries while classifying them into four categories based on factors such as the political systems. Likewise, Mellor (2005) encouraged scholars when attempting to classify the Arab media systems, to examine each country separately, which will allow them to enhance the understanding of how the media systems evolve in each country. Therefore, it is essential that I should take into consideration the development of media systems theories when studying emerging practices such as data journalism.

In recent years there has been a vast amount of discussion in relation to the media systems around the globe, with scholars attempting to identify how politics and other factors influence them. As a result, theories have been built that compare the media systems around the world to determine how they have been impacted. Early theories include the “Four Theories of the Press” by Fred S. Siebert, Theodore Peterson, and Wilbur Schramm (1978), which was published during the Cold War. They proposed the following four theories: the libertarian theory, the social responsibility theory, the Soviet theory, and the authoritarian theory. According to the Four Theories of the Press, the libertarian theory thrives in liberal democratic system of government since it is protected by the law and democratic principles such as freedom of the information and freedom of speech. It functions as an opposite form of the authoritarian theory which works as a mobilisation tool for the ruling regime, while the libertarian theory work as a fourth state that holds the government accountable for their actions. Media organisations in the social responsibility theory are required to maintain social responsibility while conducting its role in the community, this role includes informing, entertaining and selling. The media organisations in the social responsibility theory are monitored by their community, audiences, journalistic ethics, and regulations. The Soviet theory is associated with the Soviet Union and its communist party, which in fact disappeared with its collapse in the 1991 (Nerone 1995). Nonetheless, the media organisations work as a means to support and legitimise the actions of the union, which has complete control over the media organisations. The authoritarian theory is described as a mobilisation tool for government with media organisations having two types of ownership either public or private. Despite the variety of ownership, the government has a full control over the media and its contents (Siebert, Peterson and Schramm 1978).

The aforementioned theory compared democratic (libertarian and social responsibility) and authoritarian (the Soviet and the authoritarian) media systems, not only comparing these systems to one another but also dividing the world mainly into these systems. They argued that a democratic media system allows freedom of speech and allows the media to play the role of the fourth state where the media serves the public good. On the other hand, the authoritarian media system imposes censorship, and the media serves the interest of the government and the elites over the public interest (Siebert, Peterson, and Schramm 1978). However, these theories have undergone further development, McQuail (2010), Altschull (1995) and Hachten (1981) have all suggested that there is a need to have a new category for 'development theory' along with liberal and Marxist variants.

"This would recognize the fact that societies undergoing a transition from underdevelopment and colonialism to independence often lack the money, infrastructure, skills and audiences to sustain an extensive free-market media system. A more positive version of media theory is needed which focuses on national and developmental goals as well as the need for autonomy and solidarity with other nations in a similar situation. In the circumstances, it may be legitimate for government to allocate resources selectively and to restrict journalistic freedom in some ways." (McQuail2010 P.151).

However, the "Four Theories of the Press" have been criticised by scholars, eventually paving the way for new theories to emerge such as the theories proposed by Altschull (1995), Hallin and Manchini (2004), Norris (2008), Hachten and Scotton (2012) and Rugh (2004). Scholars argue that this theory tend to adapt a liberal/Western position when classifying media systems across the world, thus weakening its application to other countries such as the GCC countries (Nerone 1995). Moreover, Benson (2008) claims that it works to promote and justify the US model of market-orientation due to the ethnocentric media practises that in turn influence the view of international organisations when evaluating media practices globally.

"The market model has also influenced international organizations such as the World Association of Newspapers and the Inter American Press Association. Freedom House, for instance, rates national press systems as free, partly free, or not free, based primarily on political rather than economic criteria." (Benson 2008 P.5).

Kai Hafez (2010) argued that the four theories of the press need to be updated as the global media system has changed tremendously over the last two decades. This is due to the emergence of new media technologies and transnational forms of mass communication as well as the collapse of the Soviet Union and the emergence of new political systems around the world. Additionally, the development of this theory occurred during the Cold war, as a result it has been influenced by Cold War mindset (Josephi 2005). McQuail (2010) argued that the "Four Theories of the Press" tried to advance the American ideology of liberalism and freedom.

"The book was published at a critical moment in the Cold War when the two sides were pitted in a battle for the hearts and minds of the still uncommitted world and the freedom and unfreedom of the media was a central issue. The USA was actively trying to export its own ideology of liberalism and free enterprise, and its model of press freedom was especially important in this" (McQuail 2010 p.151).

In the context of this research, scholars argued that the "Four Theories of the Press" is not applicable outside the Western context, thus it does not fit the Arab media systems (Mellor 2013). Rugh (2004) a pioneer in terms of classifying media systems in the Arab World, claimed although some elements of the "Four Theories of the Press" are applicable to Arab media systems, namely the authoritarian theory, nevertheless the "The Arab media do not fit neatly and completely into any of these categories" (Rugh 2004 P.23). He added that to have an in-depth insight into Arab media systems, researchers must examine the contributors that impact media practices, such as the political systems (Rugh 2004).

2.2. Contemporary media systems theories

Due to the development of new political systems worldwide, several theories that compare media systems have begun to appear. Daniel Hallin and Paolo Mancini (2004) compared the media systems in Europe and North America, considering it one of the main typologies by which to examine the Western democratic media system. Hallin and Mancini's theory is based on the analysis of the similarity of 18 Western countries systems, in order to establish comparable content in these systems. Therefore, the aim of their theory is to identify the relationship between the political system and mass media in their respective area of study. They highlight this relationship by categorising these systems into three model of media and politics (Esser and Hanitzsch 2012). These models are the Mediterranean or polarised pluralist model, the North/Central European or democratic corporatist model and the North Atlantic or liberal model (Hallin and Mancini 2004).

Hallin and Mancini's typology is based on four factors to be used when comparing media systems in their respective area of study. These factors are state interventionism, political parallelism, media industries and professionalization (Hallin and Mancini 2004). These categories have been applied by Kai Hafez to establish a better understanding of the Arab media system (Hafez 2010, pp.1-13).

State interventionism, according to Hallin and Mancini (2004), is the extent of the impact of elected governments on democratic media systems. For instance, the degree of governmental influence on the US media is considerably low, which is a result of a market dominated by private media companies. In contrast, the governmental influence is slightly higher in Central and North Europe, while in Mediterranean European countries the governmental influence reaches its peak. For example, the directors of public broadcasting stations in Mediterranean European countries are appointed by the elected government. On the other hand, state interventionism in the Arab media system tends to be stricter than the Western media system; for example, the Arab media system usually defines the boundaries for journalists that should not be crossed. Moreover, in the Arab states the public media sector is owned by the state, and therefore the private sector must operate within the governmental restrictions in order to survive (Hafez 2010).

Second, political parallelism, according to Hallin and Mancini (2004), focuses on how media systems and political parties or ideologies work together — in other words, how the political atmosphere affects media practices, which in turn shapes the orientation of the media coverage. However, considering William Rugh's (2004) typology of the Arab media system, this theory only fits two of Rugh's categories: the diverse press and the transitional system. Since the mobilisation press and the loyalist press categories are unable to have the privilege of the diversity of political parties or ideologies, these countries have a one-dimensional media system. On the other hand, though the diverse press and the transitional system have the ability to be more diverse systems, nevertheless they are still considered insufficient in the Arab region. Kai Hafez argued "while still in an early phase of public political debate, Arab countries are increasingly able to develop much more pluralist and balanced media" (Hafez 2010, P. 6).

Third, media industries, as an answer to transnational competition in many Arab countries has allowed private ownership for media companies to encourage competitiveness (Hafez 2001). Although many Arab countries allow private ownership of the media companies, the government still dominates the media system in these countries. The governmental domination in the private sector takes two forms; either the government is still the main financial contributor, or the media company is owned by people from the ruling family (Hafez 2010, pp.1-13). This diversity of ownership of media companies in Arab states does not necessarily guarantee the multiplicity of media coverage, as the private sector is still loyal to the ruling regime (Rugh 2004). Yasin Al Yasin (2014) argued that the ruling regime in the Gulf Cooperation Council, with the exception of Kuwait, has complete control of appointing the editors and chief editors of newspapers in that region. Even if the newspapers are owned by private capital, the editors and chief editors of these newspapers operate as gatekeepers rather than opinion leaders. Therefore, journalism in GCC has become a tool to reinforce and mobilise the ruling regime, which consequently side-tracks journalism from its role in the society. Hence, this has affected the journalism industries in this region by allowing nonqualified personnel to take over journalistic jobs.

Lastly, professionalisation, according to Hallin and Mancini (2004), is the result of the effective establishment of journalistic ethics and the advanced states of journalistic training and education. Due to this, the Western media system tends to have a tremendous amount of freedom of press, which is lacking in the Arab media system (Hafez 2010, pp.1-13). Matt Duffy (2013) argued that culture has a significant impact on journalistic practices and contradicted the existence of universal journalistic practices. Duffy claimed that journalism is a product of the culture of the country in which it operates and that social and political elements have a great influence on journalism. The culture context influences the journalistic practices, in turn, that journalists become a tool to shape the culture of journalism they work in (Curran and Gurevitch 2005). Furthermore, journalists have the tendency to retain the values of the culture that they share with their audiences; this is one of the main impacts of the culture in the news (Curran and Gurevitch 2005). News judgment is also considered as one of the main effects on the news due to the culture of journalism since it affects the news selection and agenda nationally (Curran and Gurevitch 2005).

However, Hallin and Mancini's (2004) typology was criticised by scholars for several reasons. Firstly, Hafez (2010) argued that Hallin and Mancini's typology is not applicable when comparing media systems outside the Western context. This was a fact that Hallin and Mancini admitted in their latest book *"Comparing Media Systems Beyond the Western World",* where they asked the contributors in their book to apply the four factors they used when comparing 18 Western countries systems. The second criticism was put forth by Hafez (2010) and Khamis (2011) who argued that Hallin and Mancini's typology failed to account for cultural sensitivity, which is a crucial dimension in evaluating Arab media systems. Hafez noted, "several Arab and Iranian scholars pointed to the culturally distinct values and traditions of the Arab world that call for culturally distinct media theories and media typologies" (Hafez 2010, P.10)

Thirdly, the problematic notion of emphasising the nation-state classification when assessing media system, which lacks the capability of becoming a comprehensive unit of analysis (Kraidy 2012). Kraidy (2012) argued that there is a need for a transnational approach, which is an appropriate measure when evaluating diverse systems such as Arab media systems. He added that based on Hallin and Mancini's models, the transnational Arab media system is a hybrid of the Polarized Pluralist and the Liberal model.

> "A transnational perspective may in some cases be more heuristic than a traditional comparative approach using the nation-state as a unit of analysis. Whereas the latter may have yielded insights about the peculiarities and diversity of Arab national systems, the former opens up an exciting avenue of research that emphasizes the complexities of media operations across borders and offers conceptual innovations, including notions of a transnational system, transnational parallelism, and an expanded understanding of media professionalization" (Kraidy, 2012, P. 198).

William Rugh (2004) also developed a typology that covers the Arab media system, where he used a systematic approach to categorise the media system. In his categorisation Rugh divided the Arab media system into four types: the mobilisation press (in Syria, Libya, Sudan and pre-2003 Iraq), the loyalist press (in Saudi Arabia, Bahrain, Qatar, UAE and Oman), the diverse press (in Lebanon, Morocco, Kuwait and Yemen) and the transitional system (in Egypt, Jordan, Tunisia and Algeria) (Rugh 2004). According to Rugh (2004), in the first type, the mobilisation press, the state has complete control over the media, not only controlling the media, but also the regime tends to use the media to reinforce the government image. The second type of system in Rugh's typology is the loyalist press, where the government imposes restrictions and regulations to ensure the media's loyalty to the regime in power. Rugh defined the diverse press as follows: "a very different political environment leads to a 'diverse' media system. Contrasting and competing political parties or groups can express their views freely.

Some restrictions on the freedom of expression exist in the laws, but they are relatively minimal or not strictly enforced" (Rugh 2007, P.7). Lastly, the transitional system is where the government seeks control over media, however they are faced by resistance from the freedom of information and diversity advocates (Rugh 2004).

Rugh's typology have been scrutinised by scholars albeit mostly Arabs, for several reasons. Firstly, the theoretical foundation is lacking in the typology, for instance Al Jammal (2001) argued that all Arab press systems with the exception of Lebanon are both loyalist and mobilised at the same time. Also, Kraidy (2012) suggested that Rugh's typology lacks depth and sophistication due to its weak contextualisation of Western theories and its focus on ownership and state relation whilst neglecting the content. Furthermore, Azzi (1989) list four criticisms of Rugh's typology:

1. The typology inspired by Western theories of the press and it not criticality evaluating its application to Arab news media.
2. It tends to be a simplistic and generalised approach.
3. It does not address the cultural and social context of the Arab region.
4. It ignores the content of the press, while focusing on the relationship between media and political system.

Other scholars argued that Rugh's typology lacks some critical dimensions that need to be considered when evaluating Arab media systems, such as freedom of speech and imposed restrictions by the government (Hafez 2001) This is because the typology tends to be generalised and therefore fails to capture the uniqueness of each country in terms of its political, cultural and social context. Also, the typology neglects several factors of the Arab media, for instance the role of Émigré Media (Mellor 2005).

Also, Mellor (2005) critiqued Rugh's typology for ignoring the relationship between the Arab press and public opinion and the ability of the media to set the agenda and frame the news, alongside its failure to account for the socialisation and professionalisation of Arab journalists. She summarised her critique in two points: “unclearly defined categories and it still does not account for the recent situation in the Arab news media, which has been under rapid development since the 1990s” (Mellor 2005, P.51).

Furthermore, Iskandar (2007) argued that Rugh’s typology has not emphasised on the diversity of the Arab world in the political and social context. He also added that:

> “Rugh transplants classical typologies of media institutions wholesale from their Western contexts to the Arab world with only minor modifications that serve to affirm an increasingly outdated view of Arab media” (Iskandar 2007, P.9).

One of the main criticisms of Rugh’s typology is the focus on the relationship between the media and the political regimes, which he responds to as: it is a valid and useful assumption that arise from the “Four Theories of the Press”. “That the press always takes on the form and coloration of the social and political structures within which it operates” (Siebert, Peterson and Schramm 1978, P.1).

Also, despite Rugh’s typology focusing on state politics, it affirms that analysis needs to address the disparities of the region’s socioeconomic strata. Yet, it overlooks some socioeconomic aspects such as the contrasting level of education and literacy in the region’s countries (Iskandar (2007). Even with the critiques of Rugh’s typology, it has still managed to provide an accurate depiction of the Arab press in its early days (Iskandar 2007), also “The assumption that the state was the most significant if not sole purveyor, disseminator, and controller of information among most Arab countries was widely accepted” (Iskandar 2007, P10).

The recent change in the global geopolitical affairs such as the rise of globalisation and the collapse of Soviet Union has paved the way for several theoretical paradigms of media system to emerge, these include: Chalaby (2002) Bourdon (2004), McPhail and Phipps (2014), Thussu (2007), Mungiu-Pippidi (2008), Reese (2010), and Elareshi (2012). Ayish (2002) provided an alternative typology to Rugh's, where he proposed three categories: traditional government-controlled, reformist government-controlled and liberal commercial; however, the focus of his typology was the television industry rather than the media or press. Iskandar (2007) criticised Ayish's typology for its insufficient covering of novel forms of alternative media, highlighting the diversity within state/non-state media, the content of media and the cultures of journalism.

In summary, the development of media systems has undergone an enormous number of critical debates. This indicates a pattern where most theories evaluate media systems as a reflection of its relationship with the political system in their respective area of study. Also, it is clear that the theories of media systems lack the ability to be widely generalised and that scholars need to be cautious about its oversimplification at times.

Furthermore, it failed to accommodate emerging fields of media, which several scholars argued needed to be considered in an updated version of media system theories. For example, media system theories had failed to capture the emergence of data journalism; this resulted in the lack of scholarship historicising the role of data journalism in media systems and newsroom practices on a global comparative scale. According to Appelgren, Lindén and van Dalen, (2019), the current body of data journalism scholarships tends to focus primarily on a Western context, adding "While there is great value in exploring these pioneering data-journalism practices, the specific contexts of these countries limit the generalizability or comparability of these findings to journalists working in other countries and media systems." (P.1192)

This tendency of focusing on a Western context in data journalism studies has driven data journalism scholars to encourage researchers to broaden their focus to include non-Western contexts in data journalism studies (Fink and Anderson 2014; Appelgren, Lindén and van Dalen 2019). Some academics argue that this tendency could have a negative impact on the field of data journalism, Mutsvairo stated “Without the development of a body of research about how data journalism is being practiced and/or hindered in non-Western contexts, there is a risk that it will contribute to a widening of the cultural divide.” (2019 p8).

On the other hand, media systems, especially the Arab media system, need to consider the recent developments in the Middle East such as the Arab Spring, and its role in changing the political landscape in some of the Arab countries. Also, its impact on several issues such as the freedom of speech and freedom of press, as well as the reforms that occur as a result of this movement. In addition, new versions of Arab media systems need to account for the technological advancement of the news making process and its impact on the media, as well as the wider usage of social media to either publish or find news stories.

Furthermore, media system scholars should divide the Arab World into several parts, and not treat them as a solo unit. This is because there are a lot of differences between Arab countries, for example, the wealthy countries of the GCC enjoy a world-class IT infrastructure, unlike countries in other parts of the Arab World (Allagui and Ayish 2017). As well as this, they should consider the role of the financial influence of GCC countries on the media landscape in the Middle East, since a lot of media organisation in the region are owned by GCC government or people close to the ruling regimes (Rugh 2004).

2.3. History of Data Journalism

In order to understand how current data journalism practices have been shaped, it is imperative to shed light on the current debates surrounding the use of data in media, computer-assisted reporting and computational journalism. Anderson (2018) listed three major moments in the development of data journalism practices, which he described as “crystallising moments” although these are in the context of the USA. The first moment, is centred around social progressive movements. This movement believes in the power of quantitative data as a strategic mean of progression and reform. The second moment involves the invention of "precision journalism" which over time evolved into CAR, benefiting from the technological advancement. The third moment is currently taking place and is where some advanced journalism institutions were able to turn stories into databases by utilising computational journalism, enabling them to structure the information. Anderson (2018) stated that:

> "These developments mark a further transformation of both journalistic objectivity and tools available to journalists to tell stories in new ways. They also mark a shift in more generalization understanding of what data means to social scientists and other empirical knowledge workers" (Anderson 2018, P.12).

Moreover, discussing current debates around data journalism is a crucial step in fully understanding the concept. Only by having a firm comprehension will researcher overcome its "deeply contested" terminology that has been seen as imposing "analytical difficulties" on scholars (Fink and Anderson 2014). Coddington (2014) argued that it is important to establish an accurate definition of emerging fields of journalism, once this is done researchers will be able to put forward a coherent foundation for studying it. He stated:

> "For researchers, however, these definitional questions are fundamental to analyzing these practices as sites of professional and cultural meaning, without which it is difficult for a coherent body of scholarship to be built. Indeed, the nascent scholarship in the area is often characterized by initial attempts to define these forms of journalism, each of which has largely been well-conceived and conceptually useful. But taken collectively, they have produced a cacophony of overlapping and indistinct definitions that forms a shaky foundation for deeper research into these practices. As these data-driven forms of journalism move closer to the center of professional journalistic practice, it is imperative that scholars do not treat them as simple synonyms but think carefully about the significant differences between the

forms they take and their implications for changing journalistic practice as a whole."
(Coddington 2014, P.332).

Likewise, De Maeyer et al (2014) argued that media organisations have different approaches when it comes to defining data journalism at an institutional level and this has caused difficulty when it comes to evaluating its practise and implementation in the newsrooms.

2.3.1. Data in the media

The concept of utilising data in newspapers is far from novel, it can be traced back to the Roman Empire. Howard (2014) claimed that journalists exercised data collection and publication for as long as journalism has been practised, and he traced the use of data to the Roman Empire when Italian merchants followed the news for economic conditions, such as the cost of commodities. Scholars argued that the use of data as a source of news has been used for centuries, with the aim of improving traditional reporting (Gray, Bounegru and Chambers 2012). The 1700s saw the introduction of William Playfair's graphical methods, which allowed people to understand statistics (Tufte 2011). In the 18th century, with the improvement of technology, mainstream newspapers began to publish stories that were based on data, for instance, The Manchester Guardian (The Guardian) published a report in 1858 about casualties among British army personnel in the Crimean war. The report included diagrams that indicated the death per month and its reason (Rogers 2013). In the 19th century, statistics become an essential part of stories in newspapers, these mainly involved the publishing of figures and raw data about commodities (Howard 2014). In the early 20th century, the USA was an increase in social movements such as Men and Religion Forward Movement (MRFM) (a part of Social Survey Movement (SSM)) who believed in the power of quantitative data as a strategic means of progression and reform (Anderson 2018). C. W. Anderson (2018) in his book *"Apostles of Certainty: Data Journalism and the Politics of Doubt"* followed the social movements in early

20th century in the USA when explaining the development of data journalism in its current form. He argued that:

> "It should be clear that social and cultural excitement around the power of quantitative data_ of even so-called big data_ is nothing new. The idea of "data" carried within it a powerful symbolic value by the early twentieth century. Data acted as what scholars of science and technology have called a boundary object, in this case a symbolic and material object that mediated between quantitative proof given and rhetorical persuasion" (Anderson 2018, P.89).

However, he noted that newspapers deemphasised the use of data and data visualisation in early 20th century due to journalism culture and technological capacity.

In the late 20th century, the introduction of computer-assisted reporting (CAR) - which will be discussed later in this chapter - enabled journalists in the USA to utilise digital data in news production; this consequently allowed them to employ large amounts of data when writing news stories. However, the treatment of this amount of data required skillsets that the average journalists did not have, forcing newspapers in The USA and The UK to recruit programmers to specifically work on such content (Parasie and Dagiral 2013).

With the technological advancements of the early 21st century, the use of data has fast become a central part of modern news organisations since data can be used as a source of a story or it can be the story itself (Royal 2015). Similarly, the use of data has gained a significant role in online news platforms, where several specialised websites rely on data analyses as their niche, such as the news website FiveThirtyEight (Royal 2015).

2.3.2. Computer-assisted reporting (CAR)

As mentioned above, in recent times a new style of journalism has begun to appear which is based on converting numbers or datasets into news stories, called data journalism.

Some scholars argue that data journalism will be the main source of information and thus journalists should have the ability to collect and analyse datasets to find stories (Knight 2015). However, the root of data journalism is based on two types of journalistic practices: computer-assisted reporting (CAR) and news infographics. According to Bruce Garrison, computer-assisted reporting is the utilisation of computers in the newsgathering process, and usually involves the use of computers to research, collect and analyse data to find news stories (Garrison 1998). The era of computer-assisted reporting began in 1952, when the TV and news station CBS utilised this technique to predict the outcome of the US presidential election (Metropolis, Howlett and Rota 1980).

This technique thrived after the receiving recognition for the use of social science in newsrooms based on the 1973 work of Philip Meyer in his book "The New Precision Journalism" (1991). Precision journalism involved the use of empirical social science methods such as surveys, content analysis and statistical analysis in order to gain insightful knowledge about a news story. Although the use of CAR first began in the 1970s, it picked up momentum by late 1980s early 1990s when it started to appear in mainstream journalism (Houston 2003). According to Meyer (1991), this technique requires journalists to have six essential skills when working with data, these skills are: the use of a computer to collect, store, retrieve, analyse, search and communicate the data (Meyer 1991). These skills enable journalists to find connections and patterns in large datasets, thus enhancing the objectivity and accuracy of journalistic practices. Philip Meyer pioneered the application of social science in journalism during the coverage of the 1967 Detroit race riots, the coverage was widely acclaimed and actually lead Meyer to winning the Pulitzer Price. In his research he surveyed African Americans during the riots, using an IBM 360 mainframe to analyse the collected data. The finding showed that people who attended college or were high school dropouts were equal in terms of participating in the protests (Cox 2000; Reavy 2001).

However, CAR was mostly used in investigative reporting and enabled journalists to conduct database-oriented projects (Cox 2000; Parasie and Dagiral 2013; Coddington 2014; Gynnild 2014); this is in line with precision journalism which became influential in investigative reporting (McCombs et al. 1981). McCombs et al. (1981) argued that precision journalism has become a theory of news rather than a technique; their argument was based on the impact of the application of social science methods on the newsgathering. Scholars however asserted to the beneficial impact of CAR on investigative reporting, allowing journalist to apply CAR to analyse and gather data to enrich investigative content (Gray, Bounegru and Chambers 2012).

The resent development of technology has had a significant impact on the utilisation of CAR. This has led to the emergence of new functions of this technique, such as the ability to create, manipulate and visualise data (Yarnall et al. 2008). Anderson (2013) argued that in the late 1990s, investigative journalists use computers to search databases to find disparities and patterns, which in turn made investigative reporting the main purpose of CAR. In addition to this, the advancement of technologies has allowed CAR to rely heavily on the ability of computers to search databases in order to expose any social issues such as inequality and discrimination (Parasie and Dagiral 2012). This is illustrated in the following statement "[The journalists] no longer needs to sift through drawer after drawer of records but instead must now be able to conceptualize questions in terms appropriate to computerized government files" (McCombs et al. 1981, P. 30). Computerised databases have enabled journalists to conduct random sampling using a computer, reducing the time needed to perform such tasks (McCombs et al. 1981).

2.3.3. News infographics

News infographics are the utilisation of graphs, charts, and maps to exemplify data. This technique is used mostly in financial journalism and weather forecasts (Gladney 1993;

Barnhurst and Nerone 2001). Scholars have indicated several roles for the use of news infographics in newspapers. Firstly, it serves as a complement to the story's content and newspapers utilise it as an attention-grabbing tool (Utt and Pasternak 2000). Secondly, it works as a way to communicate and clarify data, Edward Tufte, a leading scholar in graphics visualisation stated that "excellence in statistical graphics consists of complex ideas communicated with clarity, precision and efficiency" (Tufte 2001, P.13).

Moreover, scholars indicated that the usage of news infographics goes all the way back to 1858, when The Guardian utilised diagrams in their report about deaths among British army personnel in the Crimean War (Rogers 2013). However, the introduction of the newer techniques such as coloured infographics by the USA Today was in the 80's and led to a dramatic increase in the utilisation of news infographics as a mean of data visualisation in the storytelling process (Gladney 1993, P.17-36; Barnhurst and Nerone 2001). This is because graphics visualisation has the ability to communicate and clarify data to the readers, allowing them to have an in-depth insight into the content of the news (Tufte 2001).

New infographics usually contain three major parts: visual, content and knowledge. The visual part may include colours, graphics, signs, icons, and maps, while the content part can include facts, statistics, texts and the timeframe. The knowledge element involves the story or the message (Siricharoen and Siricharoen 2015). These parts enable audience to receive in-depth information about a news story (Yildirim 2017) by simplifying complex data and removing the obscurity within data (Salimi 2020).

Several aspects have contributed to increasing the role of news infographics to become important components for contemporary newspapers. Firstly, the rise of the importance of visual media in the current mainstream media (Mirzoef 1999) has made an image worth a thousand words (Heywood and Sandywell 2012). Alongside this, the ability of visualisation to be an alternative means of interpretation and analysis has embodied the 'visual turn' in the news making process (Dick 2015). Secondly, the computerisation and digitisation of newsrooms has paved the way for newsroom personnel to produce infographic content with ease and allowed them to keep up to date in a fast-paced information era (Ghode 2012). Thus, technological advancement has enabled newspapers to present their stories in a modern and creative way, and as a result of this, they have been given the chance to compete with other types of visual media (Bekhit 2009). Thirdly, the ability of visualisation to make the information more appealing to audience and its efficiency in conveying large data to audience has contributed to its popularity (Figueriras 2013). Salimi (2020) argued that:

> "Constructing visual representation of information is not mere translation of what can be read to what can be seen. It entails filtering the information, establishing relationships, discerning patterns and representing them in a manner that enables a consumer of that information to construct meaningful knowledge" (Salimi 2020, P.207).

In this context, it is evident that there is a significant relationship between data visualisation, which is a major aspects of contemporary data journalism, and news infographics. The term data visualisation does encompass several types of visualisations, including news infographics. It is appropriate to argue that data journalism, in its current form in particular, was a result of the development of news infographics, benefiting from the utilisation of infographics to deliver large-scale data projects. This is because infographics have the capacity to integrate several elements of data journalism within solo infographic, such as text, map, and timelines.

2.3.4. Computational Journalism (CJ)

The evolution of CAR over time has resulted in ambiguity in identifying its related practices, which in turn has led to different terminologies used to describe it. Despite this, scholars have identified several emergence practises that are in one way or another related to the CAR, such as computational journalism (Flew et al. 2012; Karlsen and Stavelin 2014), programmer journalism (Parasie and Dagiral 2013), open-source journalism (Lewis and Usher 2013) and data journalism (Appelgren and Nygren 2014; Fink and Schudson 2014; Gynnild 2014) to name a few.

Hamilton and Turner were among the first researchers to identify CJ in their work in 2009, where they argued that computational journalism is "the combination of algorithms, data, and knowledge from the social sciences to supplement the accountability function of journalism" (Hamilton and Turner 2009, P.2). Since then, research into data journalism and CAR related practices has grown dramatically. According to Borges-Rey (2020, P.257-258) there are four predominant characteristics that include; (a) a collaboration between journalists, developers, statisticians or graphic designers (Parasie and Dagiral 2013; Fink and Anderson 2015; De Maeyer et al. 2015); (b) an engagement in open government advocacy to pressurise governments and local authorities in to releasing more data (Anderson 2013 a; Parasie and Dagiral 2013); (c) co-reporting and public engagement through crowdsourcing (Daniel and Flew 2010; Flew et al. 2012; Appelgren and Nygren 2014; Karlsen and Stavelin 2014); and (d) having robust methodologies and analytical tools (Meyer 2002; Borges-Rey 2016).

Despite the prevalence of Hamilton and Turner's (2009) definition of computational journalism, the definition failed to distinguish between CAR, CJ and data journalism practises. This fact was highlighted by Coddington (2014) in his definition of computational journalism, where he defined CJ as:

> "a strand of technologically oriented journalism centered on the application of computing and computational thinking to the practices of information gathering, sense-

making, and information presentation, rather than the journalistic use of data or social science methods more generally" (Coddington 2014, P.335).

Stavelin (2013) defined CJ as "the overlap between computing and the purpose and goals of journalism" (Stavelin 2013, P.51). This definition was based on the nine principles of journalism by Kovach and Rosenstiel (Kovach and Rosenstiel 2007) which outlined with the purpose and goals of journalism. This definition of CJ put forth by Stavelin (2013) was based on how CJ differs from other computer-oriented practises, such as CAR and data journalism. The researcher listed three distinctions between CJ and other computer-oriented practises. 1) CJ is platform-centric instead of story-centric 2) CJ can add computable models 3) CJ applies computational thinking. Stavelin (2013) and Coddington's (2014) definition of CJ assigned computational journalism to the computational thinking concept, which itself is based on a notation of thinking like a computer scientist (Wing 2006). Wing (2006) depicted several characterises of computational thinking, these include:

- "Conceptualizing, not programming. Computer science is not computer programming. Thinking like a computer scientist means more than being able to program a computer. It requires thinking at multiple levels of abstraction;
- Fundamental, not rote skill. A fundamental skill is something every human being must know to function in modern society. Rote means a mechanical routine. Ironically, not until computer science solves the AI Grand Challenge of making computers think like humans will thinking be rote;
- A way that humans, not computers, think. Computational thinking is a way humans solve problems; it is not trying to get humans to think like computers. Computers are dull and boring; humans are clever and imaginative. We humans make computers exciting. Equipped with computing devices, we use

our cleverness to tackle problems we would not dare take on before the age of computing and build systems with functionality limited only by our imaginations;

- Complements and combines mathematical and engineering thinking. Computer science inherently draws on mathematical thinking, given that, like all sciences, its formal foundations rest on mathematics. Computer science inherently draws on engineering thinking, given that we build systems that interact with the real world. The constraints of the underlying computing device force computer scientists to think computationally, not just mathematically. Being free to build virtual worlds enables us to engineer systems beyond the physical world;
- Ideas, not artifacts. It's not just the software and hardware artifacts we produce that will be physically present everywhere and touch our lives all the time, it will be the computational concepts we use to approach and solve problems, manage our daily lives, and communicate and interact with other people; and
- For everyone, everywhere. Computational thinking will be a reality when it is so integral to human endeavors it disappears as an explicit philosophy" (Wing 2006, P.35).

CJ allow journalists to perform tasks that were previously difficult to preform, either due to time constraints or financial difficulties. Diakopoulos (2011) described the process of CJ as the use of a computer to perform journalistic activities, such as information gathering, sensemaking, communicating and dissemination. Anderson et al. (2012) mentioned that machines can be a mean to reduce the costs associated to journalism and improve its editorial output, since it has a superior ability to create value from large amount of data at high speed.

Despite the plethora of definitions, CAR, CJ and data journalism are still often confused with each other, and at times they treated as synonyms for each other. I will now attempt to highlight common themes between them, while also distinguishing them from each other.

Stavelin (2013) who wrote extensively on CJ, described these practises as a computer-oriented approach to journalism, and that they required special skillsets and advanced computer literacy. He added that these set of practices should always be under constant development, in order to stay fresh and stay relevant. For example, in 1999 Philip Meyer argued that scholars should stop using CAR when describing working with computer, he encouraged them to "move on to a fresher, more ambitious concept" (Poynter Institute 1999, P.5). Also, Stavelin (2013) argued that these computer-oriented approaches are often depicted as process of news making, which involves several steps such as information/data gathering and information/data presentation.

CJ and data journalism are often labelled as products that emerge because of the development of CAR (Coddington 2014), however Diakopoulos (2011) argued that CJ is far more advanced in terms of computer utilisation than CAR, which is usually based on processing capabilities, such as aggregation, relating, correlation and abstracting. Coddington (2014) stated that despite the common usage of computers between CJ and data journalism, with both using computerised tools to analyse and present data, they are both distinct from each other. For instance, Anderson (2018) listed two examples of computational journalism that differed from CAR and data journalism. These examples are the work of Coddington (2015) about news aggregation and the work of Graves (2016) about the fact-checking movement. In a similar manner, Stray (2011) argued that despite the several similarities between data journalism and CJ, they both utilise different functions of a computer in the process of news making. The aim of data journalism is to use computer tools based on data analysis and to produce data driven stories, on the other hand CJ aims to create computer models that are based on the extraction of information (Stray 2011). Table 1 below is the work of Stavelin (2013), showcasing his attempt at distinguishing between CAR, CJ and data journalism by highlighting the focus and required skills for each type. In the same vein, Coddington (2014) depicted the distinction between these practises by stating:

> "The three practices, then, are distinct quantitatively oriented journalistic forms: CAR is rooted in social science methods and the deliberate style and public-affairs orientation of investigative journalism, data journalism is characterized by its participatory openness and cross-field hybridity, and computational journalism is focused on the application of the processes of abstraction and automation to information" (Coddington 2014, P.337).

Table 1. compering software-oriented modes of news production (Stavelin 2014 P.47)

	CAR	**CJ**	**Data journalism**
Focus	Utilizing computer tools to produce journalism	Creating, adapting or Using computational tools and method in/as journalism	Finding, analysing and presenting data as/in journalism
Distinctive skills	Advanced computer tool-use	Computational thinking, programming	Data wrangling, data storytelling

2.3.5. Epistemological ambiguity and implication

One of the main difficulties that scholars face when attempting to examine data journalism in its current form is unpacking its relationship between technology and traditional journalistic identity and epistemology (Young and Hermida 2019). Researchers have attempted to clarify this confusion and conflicting notion, this includes the work of Usher (2016) Lesage and Hackett) 2014, Lewis and Westlund (2014) and Borges-Rey (2017). Usher (2016) placed emphasis on identity, positioning data journalists as a part of new branch of interactive journalists. While Lesage and Hackett (2014) focused on data journalism and its relation to the regime of objectivity. Lewis and Westlund (2014) emphasised the big data phenomenon and journalism, and Borges-Rey (2017) focused on the approaches of data journalism that run between newshound to techie. Borges-Rey's (2017) classification was based on the work exploring data journalism epistemologies by Parasie and Dagiral (2013), Gynnild (2014), Coddington (2014) and Parasie (2015). According to Borges-Rey (2017, P.2)

> "The first approach as 'newshound', or the traditional journalistic ways of handling and engaging with data; and the second one as 'techie', which designates an emergent journalistic approach to data based on more computational logics and mindsets".

Borges-Rey (2017) placed Parasie and Dagiral's (2013) epistemology near the newshound approach, since they viewed data journalism as a continuation of the muckraking journalistic tradition that involves the journalistic process of finding hidden stories within data. Furthermore, Borges-Rey (2017) placed other approaches such as investigative journalism paradigm and CAR paradigm (Parasie 2015), CAR (Coddington 2014), precision journalism and data journalism (Gynnild 2014) towards the end of the newshound approach's spectrum which is related to the traditional aspects of journalism, such as watchdog and forth estate. On the other hand, the other end of the spectrum is the techie approach; an approach that arose from notion of computational thinking and the collaboration between journalists, programmers and civil actors who aimed to increase governmental accountability and public involvement by exploring data. Borges-Rey (2017) placed practises that include, data-driven approach (Parasie 2015), data journalism and computational journalism (Coddington 2014), computing journalism (Parasie and Dagiral 2013), computational journalism and journalism as programming (Gynnild 2014) towards the other end of the spectrum of techie. However, within the frameworks of these two approaches Borges-Rey (2017) distinguishes the three approaches that were put forward by Gynnild (2014): newsrooms, entrepreneurial and academic. According to Gynnild (2014) the newsrooms approach refers to the activities of computational exploration in journalism (CEJ) that are taken by journalists to account for the quantitative data, while the entrepreneurial approach "is focused on the constitution and maintenance of the database that web or mobile applications can be built upon" (Gynnild 2014, P.720). The academic approach is the coming together of multidisciplinary researchers such as information scientists and the media and contributing to computational innovation in journalism inspired by the computational thinking concept (Gynnild 2014). Borges-Rey (2017) placed the newsrooms approach towards the end of the newshound spectrum, while he placed the latter approaches towards the techie end of spectrum.

This figure was redacted for copyright purposes

Figure 1. Borges-Rey's spectrum (2017)

Due to the "explosion" of data journalism literature in recent years, academics who have attempted to define the concept whilst viewing it from several approaches: a) its relationship and separation to/from other forms of journalism such CAR (; Gray, Bounegru and Chambers 2012; Royal and Blasingame 2015) b) the movements of openness and transparency (Anderson 2013 a; Parasie and Dagiral 2013; Karlsen and Stavelin 2014; Borges-Rey 2016; Boyles and Meyer 2017; Anderson and Borges-Rey 2019) c) data journalism elements such as visualisation and interactivity (Weber and Rall 2012; Knight 2015; Appelgren 2017; Young et al. 2017) d) finally, data journalism as a process (Fink and Anderson 2015; Hermida and Young 2016). From these definitions it is apparent that the predominant epistemological approaches are an interplay between the newshound approach and the techie approach, which are related to journalistic conventions and computational process and logics (Borges-Rey 2017).

2.4. Journalism in the Gulf Cooperation Council (GCC)

2.4.1. GCC overview

The Gulf Cooperation Council is a national organisation formed on 25th May, 1981, by the monarchical leaders of six countries in the Arabian Gulf area; Bahrain, Kuwait, Qatar, Oman, Saudi Arabia and the United Arab Emirates (Metz, 1994; Nakhleh, 1986; Twinam, 1992). The creation of the GCC came as a result of the rising threats surrounding the region such as threats from the Soviet invasion of Afghanistan, the Iran-Iraq war, the Israeli bombing of an Iraqi nuclear reactor and the threat of Shia fundamentalism (Nakhleh 1986).There are several common characteristics across these countries and but there are also some differences (Metz, 1994). For instance, they share a regional culture that is referred to as the "Khaleeji (Gulf) Culture", they are also similar in terms of the Gulf dialect of Arabic and share similar styles of cuisine, dress and music (Hourani 1991). The aim of forming the GCC was to allow a cross-national partnership between its members in various aspects ranging from economic and financial affairs to education, health, administration, and tourism (Twinam, 1992). “a vehicle for comprehensive social, economic, and cultural development and for effective regional stability and security” (Nakhleh, 1986, P. v).

The GCC countries are located in the Persian Gulf/the Arabian Gulf. This is one of the main transportation hubs for the oil industry and is the backbone of the economies of these countries. The oil and gas industry has boosted the economy and wealth of the GCC states, something that is evident in the per capita incomes of these countries when compared to other countries in the Arab world. (Lagasse et al. 2008). Consequently, GCC countries tend to rely on non-citizen economic migrants to counter the shortage of labour, for example in 2019 there were around 10 million non-Saudi workers in Saudi Arabia, the equivalent of 73% of the work force in the country (Anon. 2020).

The ruling system in these countries are monarchies who only allow minimal political representation that takes the shape of advisory council or a parliament. In the GCC countries there is no existence of political opposition whatsoever, with the only exception being Kuwait, and in some cases the members of the advisory council and the parliament either appointed by the government or elected (Auter and Al-Jaber 2003; Lagasse et al. 2008).

2.4.2. Media Developments in the GCC States

In order to understand the contemporary journalism practices in GCC newsrooms, it is important to trace back the development of the media in the region and in each state. This will allow me to address how the media industry has developed and taken shape since its inception until the current time.

Traditional mass media began to appear in the Gulf Cooperation Council (GCC) at the beginning of the twentieth century, with a common pattern of complete control by the ruling regime. Generally, media companies were owned and operated by governmental officials, this was to ensure that journalism works for the interest of the ruling regime. However, with the introduction of advance communications technologies, this pattern began to slightly change, as the GCC governments started allowing private capital to invest in media companies (Boyd 1999; Gunter and Dickinson 2013). Despite this change in ownership of media companies, the ruling regimes in the GCC remain in full control over the media companies (Ghareeb 2000, pp.395-418). This is due to two reasons; first, some media outlets are either owned by the government or by people related to the ruling regime, such is the case with Saudi government with the satellite channels like MBC, Orbit and ART (Hafez 2010, pp.1-13; Awad 2010). Second, the government act as an economical support for media outlets by providing subsidies, in order to help media companies, overcome any financial difficulties (Awad 2010). The new forms of mass media e.g., satellite TV channels has contributed to shifting the media landscape in the GCC, which was clear in the change of consumption patterns (Boyd, 1999; Auter and Al-Jaber 2003). The introduction of advance communications technologies and the variety of non-local media platforms has allowed the audience to expand their choice of content to content that governments in region have no direct control on (Ghareeb 2000; Guaaybess 2002).

The popularity of this new content and competition in the media marketplace in the region, in addition to the inability to control the information workflow and obsolescence of national television systems in the region has led the GCC states to create a new media environment in all GCC countries (Adhoum 1996). The new media environment is depicted in Rugh's (2004) typology of the Arab world:

> "After everyone saw the impact of CNN during Desert Storm, the Saudi were quick to recognize that satellite television was a powerful tool which they could invest in. after the Saudis took that step, others followed" (Rugh 2004, P.213).

Despite these developments, the governments still imposed strict control over the media by utilising the forms of ownership of media infrastructures, which were either owned by the governments itself or by individuals with ties to it (Hafez 2010, pp.1-13). However, the establishment of new media environment in all GCC countries has led to a limited presence freedom of expression in the news. This was driven by the independence of privately-owned from government owned media originations since the main role of latter is to be a mobilisation tool for the government and its policies (Ghareeb, 2000).

These developments started to spread from the GCC to other part of the Arab world due to two primary reasons; 1) the wealth of GCC citizens allowed them to invest in media companies, 2) the migrations of media personnel and experts from other parts of the Arab world to work in media companies that owned by the GCC citizen, which in turn paved the way for other countries to adapt the GCC model (Guaaybess, 2002; Rugh, 2004). Despite the widespread adoption of the GCC model by countries in the wider Arab world, media organisations that are based in the GCC still dominate in the Arab world.

Even with governments losing their complete ownership of media organisations, they still mostly remain in control of the content of media companies (Boyd, 1999). Apart from ownership, the GCC media personnel lack institutional protection such as professional unions, this lack of protection had led journalists to avoid the discussion of serious issues (Rugh, 2004).

2.4.3. Journalism development in the GCC

To understand the journalism practices in the GCC, it is important to follow its historical development, in order to gain in depth insight about its transformation that has shaped its current form.

Journalism began to appear in the Gulf Cooperation Council (GCC) at the beginning of the twentieth century in Saudi Arabia, Kuwait and Bahrain and it spread to Oman, Qatar, and the UAE in the early 1960s and 1970s. The introduction of technological developments in publishing and printing by the end of the twentieth century resulted in a dramatic increase in the number of newspapers published. Not only was there an increase in the number of news publication, but there was also an emergence of newspapers in other languages such as English and Urdu (Gulf Cooperation Council 2004).

According to Al-Jaber (2012) there are three important stages of journalism in the GCC, the first stage started in 1928 when news publication appeared in Kuwait named *Journal of Kuwait,* this publication moved to Bahrain within a year of its establishment. Then in 1939 Bahrain lunched another newspaper *Al-Bahrain,* this newspaper played a significant role in supporting the UK against Nazi Germany.

The second stage occurred between 1949 to1956. One of the main aspects of this phase was the emergence of several news publications in the region. A worthy example worth mentioning is the *Voice of Bahrain*, which was a news magazine that offered a high quality of contents by hiring intellectual writers and covering issues that were of interest for the people of Bahrain. However, it suffered a great deal of censorship and governmental restrictions, which in turn impacted its prominence (Al-Jaber 2012). As a result of these tight restrictions, in 1970 Kuwaiti newspapers started to attract writers, since Kuwait had relatively better freedom of expression when compared to other parts of the GCC (Al-Jaber 2012).

The third stage in 1990s demonstrates the Western influence in the form of the CNN coverage of first Gulf war in Iraq. This in fact posed a challenge for print journalism by broadcast journalism which benefited from the introduction of satellite TV channels in the region (Al-Jaber 2012).

2.4.4. Emirates Press

Journalism in UAE started later than in other countries of the GCC. In fact, the first newspaper in country only started in 1965, under the name of *Dubai News*, and was due to a governmental effort by Dubai Municipality Media Directory. In 1968 the Emirate of Ras Al Khaimah followed Dubai and issued a magazine, in 1970 other Emirates followed the steps of Dubai and Ras Al Khaimah and began issuing news publications. However, all these attempts were short lived, until the issue of the *Al-Ittihad* in 1969, a weekly newspaper by the Department of Information and Tourism in Abu Dhabi. This became a daily newspaper on April 20, 1972 and still exist until this present day. The establishment of *Al-Ittihad* opened the door for other newspaper to begin publication such as *Al-Wahda, Al-Khaleej* and *Al-Bayan* in 1970s and 1980s (Gulf Cooperation Council 2004).

2.4.5. Bahraini Press

Bahrain is a pioneer in the region in terms of the journalism industry, for instance in as early as 1930 Bahrain issued the “Press Regulation Law” in order to regulate the press in the country (Gulf Cooperation Council 2004). Following this law, in 1939 by Abdullah Al-zayed issued the first newspaper in Bahrain called *Bahrain news*. However, the efforts of Al-zayed and others that went into creating the Bahraini press were met by reluctance from the British colonial rulers. An illustration of this reluctance is captured in the fact that the British colonial rulers closed approximately 10 newspapers between 1930 and 1960, for different reasons such as the promotion of anti-colonial movements or the newspaper's supporting of nationalism (Gunter and Dickinson 2013). However, in the post-independence era there was no significant change in Bahraini press as it was still under control of the political authorities, albeit they were Bahraini rather than British.

2.4.6. Omani Press

Omani press history is relatively short and began in 1970 with the issue of the country's first newspaper under the title *Al-Watan*. Despite its recent history, Omani journalism has expanded tremendously, for instance currently there are nine daily newspapers published in Oman. Five of these dailies are published in Arabic, while the other four are published in English. In terms of ownership, only two dailies are government-owned while the remainder are privately owned (Al-Kindi and Al-Syabi 2016). In 2004 the Omani Journalists Association was established and most of print media journalists have become members. Despite the creation of association, it does not have an influential role in the Omani journalism landscape as it lacks the ability to protect journalists and assert the role of journalism in the country (Al-Kindi and Al-Syabi 2016).

2.4.7. Saudi Press

The development of journalism in Saudi Arabia has undergone three important phases since its inception. An extensive body of scholarship and research has depicted its development mostly in Arabic; however, these three stages were the common theme in them by scholars (Alshamik 1982; Alhabbab 2001; Al-Hazmi 2002; Al-Shebeili 2000; Izaat 2008). These stages include individual press, press merging and organisational/institutional press.

The individual press stage took place between 1924 and 1964 and has several defining characteristics. First, most of the news publications are owned by individuals or families and any person was able to create their own news publication with minimal effort. Also, most of the news publication in this era were in the Western part of Saudi Arabia, formerly called AlHijaz. *Um Al-Qura* was one of the main publications of this period and was established in 1924 in Makkah. It was the first newspaper to established itself under the present regime; consequently, it became the official newspaper of the country and is now issued by the Ministry of Culture and Information (Alshamik 1982; Alhabbab 2001; Al-Hazmi 2002; Al-Shebeili 2000; Izaat 2008). Al-Shebeili (2000) who has written extensively on the topic of mass media in the Kingdom of Saudi Arabia argued that the individual press stage has four main characteristics which are listed below.

1. The news and analysis of this era mostly focus on the news of the King and government officials but reports often lacked quality and there was no clear agenda and journalistic standards.
2. Despite the low quality of the news, the news coverage of this era was objective, courageous and it has no fear of the authorities.
3. The common personnel who worked in or owned the publications in that era were writers, intellectuals, and poets. They all had a great influence in the styles of the publications and so reports tended have more a literary style rather than a journalistic style.
4. Even with the government support, the individual press encountered financial difficulty, hindering its development; this was the main reason for its demise.

Al-Shebeili (2000) and Alshamik (1982) stated that only seven news publications out of approximately forty survived this era and still operate until now, these include Al-*Madina*, *Al Jazirah* and *Okaz* to name few.

The press merging stage happened between 1959 and 1964. During this stage the government realised that the number of news publications was too large, and they did not necessarily conform to the Saudi population. Furthermore, many news publications suffered financial difficulty and its production standard was weak, due to this many owners of news publications were forced to merge with others. This resulted in the creation of new publications. The government in fact encouraged this process as it helped organise the press in the country, although they did not play an active role, nor did they have any direct interference on the process (Alshamik 1982; Khayat 1996; Izaat 2008).

The organisational/institutional press stage began in 1964, when the government issued the Press Establishments Law. As a requirement of this law the right of individual ownership of newspapers was voided, which in turn opened the door for press organisations. Al-Shebeili (2000) mentioned that there are four factors that contributed to the issuance of the Press Establishments Law.

1. The previous eras lack an appropriate business model which impacted its financial resources. This was apparent from the absence of revenues generated from advertisements and distribution.

2. The non-professional workers who ran the press had a great influence on the press content. Due to this, the content usually lacked impartially and other journalism principles.

3. The government's desire to establish a well-developed journalism industry in the country, which could help the government in confronting any foreign ideologies such as Arab nationalist regime of Egyptian President Gamal Abdul Nasser.

4. The establishment of the Ministry of Culture and Information in 1963, and the ambition of its minster to develop the press into an institutional structure.

Having said this, there are several similarities in the development of journalism in the GCC countries, indicating the atmosphere of these countries is the alike. There are several common patterns that are worth mentioning; firstly, the rulers of these countries remain in control of the media, despite the diversity of media ownership, and newspapers must operate within strict restrictions imposed by the regimes. Secondly, despite the existence of journalists' unions or professional unions in the GCC countries, they do not enjoy the status of their counterparts in the West. These unions lack the ability to defend and protect its members and have failed to create a better environment for journalists to perform their role in their communities (Rugh 2004). Thirdly, journalism in the GCC in its early days displayed a great reliance on foreign Arab expats, particularly from Egypt and the Levant. This contributed to the popularity of the GCC's model in the Arab world, enabling the GCC countries to work as media hubs in the Arab world (Kraidy 2012).

2.5. Journalism in the GCC in relation to media theories

In the context of this thesis, which is investigating data journalism practises in four countries of the GCC, Rugh's typology stand out as a more rigorous and comprehensive depiction of Arab media system. The sample of this study (Sudia Arabia, UAE, Oman, Bahrain) fall into his classification of loyalist press. Rugh applied two dimensions when classifying Arab media system; a) press characteristics and b) political conditions. The press characteristics include four characteristics: ownership, variety, view of regime and style and tone. While the political conditions include the nature of the ruling group, the presence of public debate and the existence of political opposition (Rugh 2004). The loyalist media countries follow a similar path in their news practises and selection, they are alike in terms of press characteristics and political conditions. For instance, all countries are ruled by monarchies, there is also no existence of political opposition unlike in Kuwait which is a member of the GCC.

UAE, Bahrain, Oman, and Saudi Arabia’s media systems are classified as loyalist systems. Rugh (2004) designated them as loyalist since the overwhelming characteristic is that the newspapers are always loyal and supportive of the regime even though they are mostly privately owned. In order to understand his typology Rugh (2004) listed several dimensions, including ownership and content, to explain how newspapers in loyalist systems function.

The ownerships of newspapers in these countries are mostly private. This is one of main characteristics that distinguish the loyalist systems from other systems in the Arab world. For instance, private ownership is considered an unwritten rule in these countries, hence the law of Saudi Arabia stated that newspapers must be privately owned (Rugh 2004). However, there are a few exceptions to this unwritten rule of private ownership, such as the case of Oman where the government owned two newspapers (Al-Kindi and Al-Syabi 2016). The Omani minster of information responded to questions concerning the government’s ownership of two media outlets, asserting the media does not attract private investors since it is too expensive and generates too little profit (Rugh 2004).

The content of the newspapers in loyalist system is another dimension that enables researchers to understand the dynamics of newspapers in these countries. Rugh (2004) described the content in loyalist countries:

> “The loyalist press in each country tend not attack the basic tenets of national policyas enunciated by the regime, it eschews criticism of the personalities at the top of the notational government, and it exhibits little real diversity of treatment or view on important issues” (Rugh, 2004, P.65)

However, Rugh (2004) also pointed out that the loyalist press will at times criticise government services and produce stories that have a negative undertone about some government officials. For example, Makkah Newspaper published a data story about the responsiveness of official spokespeople for several ministries and how they interact with journalists' inquiries (see picture) (Arab News 2017).

Likewise, Kapiszewski (2006) pointed out that it is possible to feel some openness in Saudi newspapers, particularly when they start to discuss issues that were prohibited to mention in the past, such as the existence of radical Islam in the community. Despite these changes in the loyalist press content, Rugh (2004) argued that such stories do not occur every day and its criticisms is considered gentle by Western standards, also it eschews any casting of doubt on the higher leadership.

Furthermore, the tone and style of loyalist press is more passive, causing them to avoid reporting any critical issues and reacting slowly to events. The loyalist press also usually acts as a publicity tool for government activities and achievements by supporting and promoting their events and accomplishments, and by allocating the adequate time and effort in the news production process. Also, the rare occurrence of thorough and investigative reporting is common in loyalist press (Rugh 2004). This is significant in relation to the data journalism practices, scholars such as Boyles and Meyer (2017) argued that the existence of investigative practises in the newsrooms will lead to a neutral and smooth implementation of data journalism practises. Although there may be thorough investigative reporting on rare occasions, the loyalist presses still lack diversity in its news stories and commentaries by giving the utmost priority to government related stories while treating other stories as a secondary news (Rugh 2004).

In 1990s the GCC countries began to relax its restrictions on the press; this is obvious by the introductions of new press laws. For example, in 1999 the King of Bahrain said that people and journalists should question the government about the development in the country. This, in turn facilitated the discussions of issues that were once considered as taboo, such as the performance of the ministries of interior and defence. However, despite the relaxation of restrictions on the press, the government still intervene harshly in certain cases (Rugh 2004). By way of illustration, in 2017 the Bahraini government suspended the Al Wasat newspaper until further notice (Anon. 2017) due to its recurrent violations of the law, in particular its article about the protests in Morocco which contained a defamation of a sisterly Arab country[1]. At times, the governments in the GCC countries ban or fire chief editors, editors, journalists and columnist for criticising the country's social and political traditions, for instance in 2003 Jamal Khashoggi was fired from his job as a chief editor of AlWatan newspaper (Rugh 2004).

Rugh (2004) in his taxonomy of loyalist media argued that there are four factors that contribute for press loyalism in the GCC countries, including the following: the government uses influence derived from legal authority, its financial benefits and this influence is effective because the press is susceptible to it and because of the political environment.

These factors in addition to other impact on journalism content will be discussed in the next chapter.

2.6. Hierarchy of Influences

This section will provide a perspective on the hierarchy of influences' levels that effect the content of data journalism, such as organisational impact, routine and practices, and the individual's role.

There are numbers of theories regarding the influence on journalism and news work, the hierarchy of influence is one of the most widely known of these theories. The work of Shoemaker and Reese (2014) starts from micro level (individual), routine practises, media organisations, social intuitions and social systems.

1- Individual level; investigate the effect of an individual's characteristics in the news making process such as ambitions and ethics.
2- Routine and practices level; focus on the environment that journalists operate within. This includes the newsrooms' structure and patterns.
3- Media organisation level: investigate how the organisation impacts the news content. This includes the occupational roles and organisation policies.
4- Social institutions level: investigate how media organisations fit into larger institutions that are considered a part of a bigger structured relation, for example the economic imperatives of journalism.
5- Social system level; examine the impact on news content from different aspects such as the political and ideological aspects (Shoemaker and Reese 2014).

At the individual and routine and practises levels newsmakers' personal values can impact and frame their content, also in higher level (media organisation) that journalists work for can likewise impact the news content. For instance, journalists working at the BBC produce the content differentially from journalists working in private news organisations such as The Guardian (DeCillia 2017). Also, Shoemaker and Reese (2014) pointed out in a social institution the relationships of media organisations and other institutions can affect the content, the influence of the social institution take the form of regulations and laws issued by governmental institutions. In the same fashion, Rugh (2004) argued that governments derived their influence in the media industry from its legal authority such media laws. Furthermore, Rugh (2004) mentioned the political environment is one of other factors that influence news organisations in loyalist countries. This is in agreement with Shoemaker and Reese (2014) social system level as an aspect of influence in the content of the news. Shoemaker and Reese (2014) further argued that media institutions serve a hegemonic function by producing content that is in line with the state/regime ideology, hence one of the main elements of loyalist press is their performance as an echoing voice for regime.

In a theoretical sense, Shoemaker and Reese (2016) believed that their theory will allow scholars to understand the complex picture of the levels that shape media content.

> "This model helps disentangle the relationships among individual-level professionals and their routines, the organizations that house them, the institutions into which they cohere, and the social systems within which they operate and help maintain." (Shoemaker and Reese 2016, P. 2).

They also claimed that their framework will shed light on how the media shape public opinion, by understanding the content and factors that influence it. Additionally, they argued that there are no dominating levels in their hierarchy of influence. This was a point they in fact contradict in their latest book by placing emphasis on the social systems level as the fundamental base for the other four levels (Shoemaker and Reese 2014). The domination of social systems among other levels is a result that confirmed by Hanitzsch and Mellado (2011) in their research on how journalists in eighteen countries perceived influence in their work.

Shoemaker and Reese's theory has been seen as American-centric. This requires scholars to account for the cultural and economic context to that particular country when studying other countries (Hackett 2006). Hackett (2006) goes further by labelling the hierarchy of influence as a heuristic device rather than a theory, it should be treated on the basis of its ability to bring quotations and organise research data not on its explanatory power.

Nam-Jin (2004) argued that Shoemaker and Reese's framework lacks clarity and preciseness, in particular the rationale behind its organisation. For example, there was no specific clarification as to why ideology was treated as a level rather than a variable or why the routine level has a lower placement when compared to the organisation level. He also added that the framework lacks the appropriate explanation of how researchers "can empirically separate the effect of one level from that of another; or how one can accurately compare those effects with one another." (Nam-Jin 2004, P.2). In response to this critique, Reese responded by arguing that frameworks such as the hierarchy of influence.

> "cannot capture all of the complex interrelationships involved in the media. Models, by definition, are meant to simplify, highlight, suggest, and organize. But in doing so, they can exert a powerful guiding effect in determining how questions are posed and defining the relationships singled out for investigation" (Reese 2007, P.31).

As a result of this gap, the hierarchy of influence underwent several attempts of redevelopment in order to encompass the new news practises and the work of (Hanitzsch et al. 2010) which is based on the response of 1700 journalists from seventeen countries around the world. One of the main findings of Hanitzsch et al. (2010) was that the perceptions of journalists did not fully reflect previously theorised patterns of influences. Therefore, they proposed six domains of influence:

- Political influence: which is derived from the political context and includes government officials, politicians, and censorship.
- Economic influence: which originates from a news organisation's business model, profit expectations, advertising consideration and need and media market.
- Organisational influence: this refers to the dynamics of editorial decision making and management routine.
- Procedural influence: this refers to the operational difficulties that journalists face in their everyday work, such as the limited resources like time and space.
- Professional influence: this refers to the policies and norms of the journalism profession such as the role of journalism in society and media laws.
- Reference influence: this refers to a diverse source of influence including professional (colleagues in other media, competing news organisations and audiences) and private (friends, acquaintances, and family). (Hanitzsch and Mellado 2011).

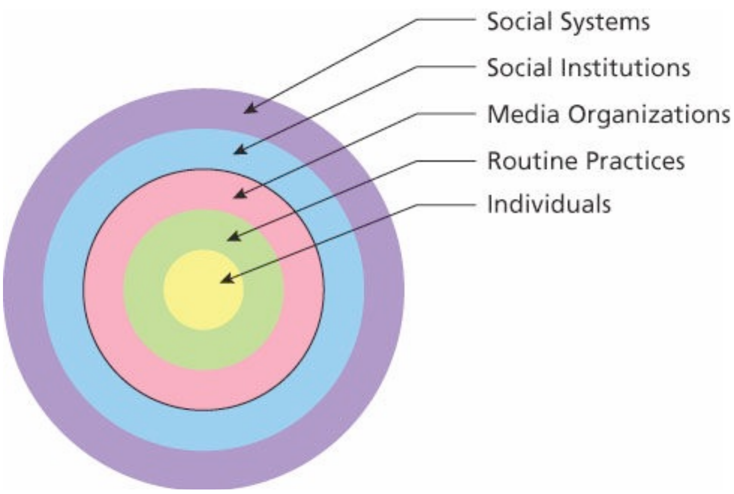


Figure 2. The Hierarchy of Influences Model uses five levels of analysis (Shoemaker and Reese 2014)

Other scholars suggested amended models to account for journalistic ethics (Voakes 1997) and emerging media and multimedia (Keith 2011). Keith (2011) argued that there are two situations that display the shortcomings of Shoemaker and Reese's framework when dealing with emerging media and multimedia. First, emerging media and a lack of established routine (Keith 2011), for example emerging media such as data journalism is yet to have a comprehensive routine in the newsrooms. However, according to the Lewin's (1947) theory of change, the new routine will take a long time to solidify especially when the media is in a transition era. Second, the hierarchy of influence and the web's lone wolves (Keith 2011), the emerging content, in particular the online content, is usually produced by individuals such as bloggers, social media users and website operators all of whom typically work outside regular media constraint (Keith 2011). The do-it-yourself mentality is not unique to online contents, but also has roots in data journalism practice (Wright and Doyle 2018).

Despite all the criticisms, the Hierarchy of Influence theory is appropriate to this thesis for the following reasons: a) its ability to determine the influence factors on the content by examining the news making process, b) its wider scope that encompasses several factors from micro to macro, including governmental impact and the journalistic role, c) pre-existence of influence factors in the loyalist press as prescribed by Rugh (2004).

2.7. The factors effecting journalism in the GCC countries.

In order to understand how journalism functions in the GCC it is important to examine the factors effecting the impact of journalism in the region. There are several factors that affect journalism in the GCC, including political impact, economic impact, organisational impact and professional impact.

2.7.1. Political Impact

Political impact refers to any governmental influence in the news making process. As Rugh (2004) described, there are four factors of the political impact on journalism and governments use its influence derived from legal authority (regulations and laws), its financial benefits, and this influence is effective because the press is susceptible to it and because of the political environment.

The GCC governments influence media by utilising its power as a legislator, it itself issued the regulations and laws that regulate media practises. Despite the diversity of media ownership in the region, governments still utilise media laws to control media entities operating in the region. All four countries have publication laws that have a lot in common, since these countries have adopted a Sharia legal system (Duffy 2014). For example, several researchers (Awad 2010; Al-Kindi and Al-Syabi 2016; Al-Mashikhi 2015) argued that media laws in the GCC countries are broad and ambiguous, and its terms lack definitions and are in fact open and general and therefore can have a wide range of interpretations. For instance, Article Eight of the Saudi prints law states that freedom of expression is guaranteed for all publications in line with Sharia laws and the constitution, however there is no freedom of expression defined within the Sharia laws and constitution (Awad 2010). The ambiguity of media laws in the GCC was the catalyst in limiting the role and potential of journalism in GCC societies (Duffy 2014). By way of illustration, the Gulf centre for Human Rights (GCHR) criticised the latest amendment in the Omani publication law which imposed tighter restrictions on the freedom of the press in the country (Anon. 2011).

These laws lack the ability to keep pace with the current developments and transitions in these countries or those taking place around the globe, and in turn it has hindered developments in the GCC's media industry (Awad 2010; Al-Kindi and Al-Syabi 2016; Al-Mashikhi 2015). For instance, Al-Kindi and Al-Syabi (2016) argued that the Omani publication law has prevented press diversity in the country, due to its regulations regarding news publications licensing, capital, and circulation.

The GCC laws have imposed restrictions on speech in a unique manner, which is vastly different from the prevailing international norms. Duffy (2014) listed five restrictions that are exclusive to the GCC context:

First, any media outlets and journalists that operate in the region are required to have a licence in all GCC countries, not only one. Second, all the GCC publication laws, with the exception of Saudi Arabia, prohibit the criticising of their rulers, any violations of these laws may lead to a fine and imprisonment. Third, the GCC laws ban the publication of any materials that can harm the economy, whilst mandating journalists to maintain truthfulness in their reporting. Lastly, the GCC publication laws contain broad prohibitions on several issues, consequently impacting and restricting the freedom of press. For example, Article 77 of Emirati publication law that stats, “No article defaming Arabs and their civilization and heritage shall be published.” (Duffy 2014, P. 27).

There are several more similarities in the GCC publication laws, for instance the prohibition of publishing any materials that may impact national security, which is a vague area that has failed to distinguish between the public’s right to know and the government’s need for security (Bebawi 2016). The United Nations Development Programme report emphasised this issue in its report:

> “In most Arab countries, the justification of ‘national security’ may be used to ban certain kinds of news and restrict the release of information to the public, even when no real threat is involved. It is one of the easiest ploys used by regimes to cover up wrong or just wishing to keep journalists at bay” (United Nations Development Programme 2007, P2).

Despite its similarities, the GCC publications laws likewise have its disparities, for example Article 22 of the Omani publication law gives authority to the minister of information to suspend, ban, seize and confiscate media publications. Although the law has given this authority to the minister of information, several Omani journalists have emphasised that these actions must be a part of judicial process (Al-Kindi and Al-Syabi 2016). In contrast to this, the Bharani publication law Article 28 states that it is prohibited to seize, suspend, or cancel the licence of a newspaper without judicial order (Anon. 2020). However, this was not the case for the Al Wasat newspaper which has been closed since 2017 without any judicial order.

The government exercises its influence via its financial benefits to media organisations since the government is one of the major sources of revenue (Rugh 2004). Awad (2010) argued that Saudi government provide financial subsides to the local newspapers in order to prevent any financial difficulties; this allows the Saudi government to intervene with the press. The governmental subsides are evident in the historical development of media ownership in Saudi Arabia. When the era of organisational press began, the government opted to limit government advertising to one main newspaper while compensating other newspapers via subsides (Mellor 2010). These forms of support are not unique to the GCC media industry, Lawrence Pintak and Jeremy Ginges (2012) argued that it is a common culture in the wider Arab context.

> "News organizations often are provided with official or unofficial subsidies by governments, political parties, and powerful businesspeople in return for following a particular political line." (Pintak and Ginges 2012, P.435).

The lack of financial and professional independence of media organisations in the GCC, has caused the susceptibility of press to become unduly influenced (Rugh 2004).

Rugh (2004) describes the political environment as the most important factor that impacts the journalism industry in the GCC. Amin (2002) depicted the political culture in the

Arab world as censorial one and as having an enormous impact on the media operation in the region. Therefore, it evident in several dimensions: censorship and freedom of the press and the religious authority.

Napoli and Amin (1997) argued that censorship thrives in countries where usually one political party dominates the political scene; this is the case with the loyalist countries as described by Rugh (2004). Censorship does not only exist in loyalist countries, but also in the Arab countries in general. This is a fact that has been depicted in research into the development of the Arab press (Boyd 1999; Amin 2002; Khazen 1999). The GCC governments utilise censorship to ensure its control over media organisations in the region, despite the private ownership in most newspapers in the GCC. Moreover, these governments have found these actions to be a legitimate way of preventing any foreign interference in their countries (Awad 2010). However, Al Kheraigi (1990) disagreed, arguing the government censorship not only targeted the foreign media, but also included the local media and therefore censorship has nothing to do with foreign interference. In addition to this, it has been argued that censorship has prevented journalists in the GCC from performing their role in the society (Pintak and Ginges 2008), for instance, about 74% of Qatari journalists found it difficult to investigate governmental corruption and about 68% of them stated that they had interference from their editors and managers when performing their journalistic role (Kirat 2016). Sakr (2003) argued that censorship is not only achieved via direct mean such as suppression of content, but also thorough intangible means such media laws related to the freedom of press. Amin (2002) stated that the media policies in Arab countries prevent journalists from criticising the principles and traditions of a country but make them reinforce them. He added that Arab leaders are sensitive about criticism and media organisations are aware about this, hence the avoidance of publishing any such content that may stir their emotions. Sakr (2006) further went on to claim that censorship in the GCC countries is a great contributor in minimising the freedom of expression and greatly impacts the faming of the news:

> “any censorship of the media — whether by governments or commercial interests — reduces public involvement in policy formulation. Censorship not only limits the opportunities for the expression of public opinion about policy choices, but also restricts the way in which such choices are framed in the first place. That is why development of the media towards transparency, freedom of expression and political pluralism is a prerequisite for fair and meaningful public participation in policy debates. That is also why it is not to be expected that ruling groups will willingly relinquish control over the organization, operation and content of media outlets.” (Sakr 2006, P.132).

A further issue with censorship is related to its vagueness. The vagueness of GCC publications laws have a negative impact on understanding the function of censorship in the GCC countries. For instance, article 24 of the Saudi printing law states “censorship shall not be exercised toward any newspaper with the exception of exceptional circumstances which is declared by the minsters council" (Anon. 2000). However, there is no further explanation of censorship or what the exceptional circumstances refer to, also despite this article, the ministry of information still censors newspaper (Awad 2010).

Freedom of the press in the GCC countries is ranked as one of the lowest across the globe, this is in spite of the fact that newsrooms in these countries are equipped with state-of-the-art technology (Dashti 2008). According to Reporters Without Borders’ index of Press Freedom, the GCC countries ranked poorly: Saudi Arabia 170, United Arab Emirates 131, Qatar 129, Kuwait 109, Oman 135, Bahrain 169 out of 180 countries (Reporters Without Borders 2020). In addition to this, the Freedom House categorised all the GCC countries as “not free” except Kuwait which was classified as “partly free”. Amin (2002) argued that presence of cultural preservation in the Arab region is one of the main limitations of freedom of press. This is because Arab journalists view themselves as defenders of the Islamic faith, its traditions and the values of Arab societies. This is something compatible with the objectives of the Arab media, as it considers itself as means of change and the frontline defence against any foreign influence. Therefore, this has prevented Arab journalism from performing its role as a watchdog, where journalism becomes the main tool to reinforce governmental messages (Pintak and Ginges 2008). Awad (2010) argued that there are six reasons preventing the freedom of the press in Saudi Arabia. First, Saudi Arabia views the concept of the freedom of the press as a Western concept, which does not have any historical or cultural context in the country or region. Second, the lack of rules and regulations that protect the press's freedom hinders journalists from enacting their true role in society. Amin (2002) argued journalists are concerned about prosecutions for defamation or slander, coupled with the fear for their own reputation, something substantial in the Muslim culture, has impacted the freedom of expression. As such, journalists will compromise their duty as truth seekers to maintain their good reputations (Amin 2002).

The third reason involves governmental interventions in journalistic activities, where the government enforces its interference in a bid to sustain political stability. Awad stated that the Saudi government interferes with the press through the following actions:

"- It is not permitted to practice any journalistic activities without obtaining a prior license from Ministry of Culture and Information.

- The Ministry of Culture and Information appoints the editors-in-chief, or at least approves their appointments.

- The government provides financial subsidies to the national newspapers in the face of financial difficulties.

- The Ministry circulates guidelines and instructions to the newspapers about publishable and non-publishable materials and subjects.

- The Ministry inflicts punishment on the newspapers and journalists when news or information not acceptable to the Ministry is published" (Awad 2010, P. 34).

The fourth reason is the intervention of religious leaders, who use their power to ensure that journalism does not publish any content that may affect them negatively. He argued that in Saudi Arabia, religious leaders have a greater impact on the freedom of the press than the government itself (Awad 2010). Al Kheraigi stated that "the failure of press freedom to thrive in the Muslim world has caused many orientalists and religious historians to equate Islam with despotism and label it as intolerant faith" (Al Kheraigi 1990, P.2). He further claimed that:

> "The state of press freedom in the Muslim countries is a sad reminder of the preponderant conviction among the ruling coterie that exposure of official malpractices will instigate mistrust and foment seditious sentiments though religion is by no means solely responsible for the press being controlled, it can be argued that some interpreters of religious law, regarding obedience to invigorate the state's iron hand by claiming that Islam has given obedience to authorities' precedence over man's freedom of expression" (Al Kheraigi 1990, P.3).

However, Mohamed (2010) debunked the notation that the Islamic faith is against freedom of expression, highlighting that freedom of expression may not be protected in Muslim countries, but it is an important value in Islam. Kamali (1994) agreed, arguing: "Islam not only validates freedom of expression, but it also urges Muslims not to remain silent nor indifferent when expressing an opinion which is likely to serve the cause of truth, justice, or be of benefit to society" (Kamali 1994, P.16).

Fifth, the Saudi press is considered a means for mobilising the government, rather than a fourth estate, which the right role for any free press is (Al Kheraigi 1990; Al-Kahtani 1999). Sixth, self-censorship leads to the emergence of a "censorial culture" among journalists, as a result of the governmental censorship on journalism. Therefore, journalists become more cautious to not cross any red lines (Amin 2002).

All the GCC countries, beside Saudi Arabia, have guaranteed the freedom of expression in their constitution or media law, however this comes with a caveat such as "within the limit of the law". This reinforces the notation of ambiguity and restrictive nature of the legislation in the GCC countries (Duffy 2013a).

Norris (2004) argued in her study covering 135 nations around the world, that there are explicit attempts by the state to minimise the role of press. These include:

"Government propaganda; official censorship; legal restrictions on freedom of expression and publication – like stringent libel laws and official secrecy acts; partisan bias in campaign coverage; oligopolies in commercial ownership; and more subtle unfairness in the balance of interests and those whose voices are commonly heard in the public sphere" (Norris 2004, P. 120).

Government such as Saudi Arabia place great restrictions on press freedom by applying official regulations, legal restrictions, and censorship (Norris 2004).

However, some GCC states allow more freedom of press to certain newspapers, allowing them to publish topics that breach state censorship rules. Nonetheless, the government will still hold these newspapers accountable for publishing or reporting news not in line with government agenda (Al Yasin 2014).

Rugh (2004) argued that there are five mechanisms related to how the government influence the loyalist media and ensure its loyalty to the regime; first, anticipatory self-censorship where the people who work in newspapers know without any guidance what the government expects from them. Second, governmental action where the states of policy or appointment of personnel serve as an insinuation of what is important and what the official governmental line is. Third, all GCC countries have national news agencies who operate under the government, the aim of these agencies is to give either direct or indirect guidance to private newspapers in relation to its treatment of governmental news. Fourth, the government officials establish an informal of private channel of communication with senior personnel in the newspapers, in order to inform them about the government's policy toward certain issues and what the government wants them to focus on in their coverage. Fifth, the GCC governments have the power of law to punish any disloyal newspaper or journalist, however they utilise this privilege in rare occasions.

Despite having these five mechanisms in place, several developments have affected the freedom of press in the GCC, including globalisation which has put GCC countries under pressure to change. This is evident in late 1990s where newspapers in GCC began to enjoy more freedom of press (Al Saqer 2016). Sakr (2016) argued that the reliance of Arab countries, especially GCC states, on foreign experts from countries like the USA and the UK to run their media companies, which in turn allow these companies to receive training and support from foreign entities such as NGOs. These activities receive different treatment to domestic NGOs in the region where they encounter tight restrictions. Therefore, these experts have paved the way for the locals to adopt the Western media mentality which holds a high regard for freedom of press and freedom of expression.

Furthermore, the wide range protests that took place in 2011 across the Arab world known as the Arab Spring and called for reform in several aspects that affect daily life such politics and the economy. During this period, media organisations were among the organisations that were targeted for reform in the Arab world and in the GCC region, demands included change in media policies and rules and allowing more freedom of press and expression (Al-Kindi 2016). Although there were some minute changes in media landscape in the GCC as a result of Arab Spring, the changes were not considered as decisive enough as they failed to cause major shifts in the media industry in the region (Al-Kindi 2016; Duffy 2013).

Despite the failure of the Arab Spring to ignite any meaningful change, there are signs of increasing press freedom in the GCC countries. This increase is driven by the process of reputation building rather than the governments giving in to national pressure (Reinisch 2010). For instance, Davidson (2009) argued that the ruling regime in the UAE are frequently developing new "sources of legitimacy" and this include press freedom.

Although, the political aspect plays an enormous role in influencing journalism practices in the GCC, influence of religion is also considered one of the main aspects that affects the media industry as mentioned previously. For example, Kraidy (2012, P.187) stated that "Saudi media policy is strongly influenced by religion". Religion is an essential part of the identity of the GCC countries, it affects many aspects of the Khaleejis' daily life. The impact of religion is evident in several examples, such as the limited number of female journalists and the segregation between female and male in some newsrooms in the region (Marghalani et al. 1998). A further example of religion playing a role in society is seen in Saudi Arabia, which was one of the few states in the world that banned women from driving and had no cinemas (Long 2005). However, with the new and ambitious strategic movement named "Vision 2030" pushed by the Crown Prince Mohammed bin Salman, there has been rapid changes in the country including lifting the ban on women driving and the opening of cinemas.

Furthermore, the GCC media laws manifest the importance of religion in the GCC societies, all GCC media laws prohibit the criticism of Islam or any divine religion. For example, article 19 of the Bahraini media law mentions that the ministry of information has the ability to ban any news publication that harms the official state religion. Likewise, article 28 of the Omani law prohibits the publication of any materials that could prejudice divine religions. Furthermore, all the GCC laws encourage a balanced freedom of expression that respect religions, the ruling family and privacy (Duffy 2013).

Duffy (2014, P. 4) stated that "Of the GCC countries, only Saudi Arabia is considered a theocracy, but Islam is central to the other five as well". Awad (2010) described the means that religious people deploy to pressure the government in Saudi Arabia that in turn affect journalism practises. He mentioned the religious class apply pressure on the state and on the media to maintain the values of Islam and to prohibit any publication that critiques any religious body or figures and ban the discussion of sensitive debates such as women's right. Religious leaders use three means to enforce their grip on the media restrictions: 1) direct communication with the ministry of information or its top leaders, 2) the issuing of a Fatwa "religious rulings" that declares the publication of certain items to be "haram" (impermissible), 3) using other media outlets to criticise any wrongdoing by newspapers or journalists. Adding to the role of religion in Saudi media, Alnajrani et al. (2018) argued that the impact of religion is one of the main not-state factors that impacts on the freedom of expression in Saudi Arabia, and the primary force behind not breaching the freedom of expression is the fear of the power of religious people exert. Although Saudi Arabia is a prime example of the role of religion in journalism, Darwish (2017) found around 23% of journalists working in UAE feel that religious consecrations are "extremely" and "very influential" in their journalistic role.

All the GCC countries are currently in an era of transition, with much of the focus on domestic reform in several aspects of the citizen's daily life. An example of this can be seen through the reform programs named Vision 2030 of Saudi Arabia and Vision 2040 of Oman (Saudi Vision 2020; Oman Vision 2020). Under closer analysis it is apparent that the media is one of the aspects that these visions are working to improve by encouraging government transparency such as the publication of accurate and relevant data about the performance of government agencies. However, the introduction of Vision 2030 of Saudi Arabia has altered the public and political landscape, that is evident in the rise of nationalistic ideology over the previous dominating religious ideology. Alhussein (2019, P2) stated that the religious ideology is suffering a regression across the country, she added:

"The discourse of nationalism is one of the weapons the government has deployed to reduce the influence of the religious establishment. In doing so, the new leadership has also sought to secure the support of young Saudis, who do not relate to the long-dominant religious atmosphere."

The nationalist narrative was a great supporter of the new measures that stunted the impact of the religious sector in Saudi Arabia. The new measures primarily included stripping key responsibilities from the religious police, thus curbing the power of religious people in the Saudi society and it causes them to fear criticising the new changes in the country (Alhussein (2019). Diwan (2017) stated that:

"The political transition from a reliance on a religious mandate to a more national posture is a tricky one. The relative empowerment of women as represented in the elimination of the driving ban is one of the central tenets – and tools – of this transformation. The decision to open the social sphere up to women – in employment, entertainment, and driving – will be appreciated by some, especially among the younger, urban population, but it is already unpopular with many in Saudi Arabia's conservative society." (Diwan 2017).

This resistance does not appear from a thin air, but it firmly has its roots in the Saudi community, for example the Islamic fundamentalist movement in the country rejected new technologies, accusing the government of allowing Western influence (Gold 2003). However, the current religious leaders have backed the government's decision, which is evident in the support of majority of the members of the Council of Senior Scholars - the highest religious authority in the country (Diwan 2017).

2.7.2. Economic Impact

The economy has an impact on journalism practises in the GCC, according to Hallin and Mancini (2004) the media is control by outside forces, with one of them being the economic force seeking political influence. Eliaspaph (1988) argued economic and political factors help to determine news content more than other factors such as social or administrative factors. Hanitzsch and Mellado (2011) in their study on what shapes the news, investigated how journalists in eighteen countries perceive the influence in their work. They pointed out that their results confirmed that political and economic factors are the most influential in news making, adding the economic influence was evident in private media unlike in the state-owned public newsrooms (Hanitzsch and Mellado 2011). The majority of media companies are commercial and aim to make a profit through news production and advertising. In fact, in some cases advertisement is considered the main objective of a media company rather than news production itself. Bagdikian (2004) argued the main aim of the media is to sell goods by utilising advertisement income and thus making a profit, rather than producing and distributing the news. Underwood (1993) claimed that the current business models of commercialising news production has enabled actors such as advertisers and investor to influence the news. However, Shoemaker and Reese (2014) argued against this notion of the prioritising advertisements and making it the solo purpose of media companies. They did however state that the owners of media organisations and the shareholders are one of the most influential factors in the media content.

> "In the rush of daily journalism, most stories cannot with any precision be weighted based on their economic payoff, but all news items are evaluated for their audience appeal, which can translate into higher circulations and ratings, thus producing greater advertising revenue." (Shoemaker and Reese 2014, P.141).

Since the early days of the Arab print media, several conditions have negatively affected its developments and performance, one of these conditions is the weakening of its economic base (El-Affendi 1993). Alongside this, the reliance of Arab journalists on an unchanged economic model that tends to rely on government's subsidies for revenue, their ability of to effectively perform their role in communities has been hindered (Amin 2000). The reliance on the government as a source on income in and of itself is problematic since it demolishes the newspaper's autonomy.

> "Most media broadcasters in the Arab world rely on their government for revenue. Most of the newspapers and broadcasters have found themselves at the mercy of their government. Some might risk closure if the government withdrew its advertising revenues, so to keep the flow of these revenues, some newspapers and broadcasters would not transcend the red line drawn by the government." (Lahlali 2011, P.39).

Newspapers in the GCC have experienced a negative economic impact, but it is a marginal impact in most cases. This impact has usually taken the form of self-censorship due to commercial considerations since these newspapers rely heavily on advertising in addition to the governmental support (Pejman 2009). Jihad Khazen, the former editor-in-chief of the pan Arab daily *Alhayat* said that:

> "We can afford to be banned in Sudan, where the currency is almost worthless, but if we are banned in Saudi Ariba, we stand to lose tens of thousands of dollars in advertising revenue. Consequently, we are more careful with Saudi news; it is a matter of economics, even survival." (Khazen 1999, P.87).

Despite the marginal impact of the economic factor in the GCC print media, the industry still faces some financial difficulties attributed to the decrease in advertising in recent years. Newspapers in the GCC used to account for 40% of all media advertising, however in recent year there has been a shift in audience preference from print media to digital platforms (Bhargara and Alkaabi 2014). These financial difficulties have contributed to a negative impact on journalists working in the region. Al-Mashikhi's (2015) study corroborated and found that around 80% of Omani journalists agreed that the lack of financial means was one of the main factors that negatively affected their performance, since it hindered the newsroom's ability to recruit new personnel, implement new technology and led to the weakening of their salaries when compared to other GCC journalists. Furthermore, Omani journalists thought that having stronger financial resources would allow newspapers to become independent from the government and enable their newsrooms to provide more training to its employees. All of this would lead to an improvement in the content they produce and would cause the newspaper to become less dependent on advertising as a means of revenue and survival. News reports would also increase in quantity if there was less reliance on advertising as adverts usually take a vast amount of space in newspapers at the expense of news contents. Journalists in the UAE likewise felt finance was a barrier to their work with around 43% believing that profit expectations are "extremely" and "very influential" on their work, however they attributed profit expectations to be driven internally (Darwish 2017).

The decline in newspapers' advertisement revenue has forced them to rationalise their expenses, leading them to close some of their offices and lay off some of its personnel. Khaled

Al Malk, the editor-in-chief of AlJaziarh newspaper in Saudi Arabia, wrote an article in 2018, where he appealed to the Saudi government to intervene and help support newspapers from the risk of bankruptcy. He asserted that newspapers were losing their capability to develop due to the financial challenges they face, with some newspapers even forced to reduce its pages and circulations to survive. He went on to claim that over the past five decades newspapers had made substantial profit, which in turn enabled them to free themselves from government subsides; but this was not the case anymore (Al Malk 2018). This article has led to a significant debate between journalists and intellectuals in Saudi Arabia, for instance Tawfeeq Alsaif, a Saudi author, argued that Saudi newspapers in its current model are inevitably fading, thus any financial support from the government will not revive print newspapers, but it will postpone their fading. He stated that Saudi newspapers need to establish a modern business model that can accommodate the fast transformation of the media and communication industry (alsharq al-Awsat 2018). Al Malk's appeal did not come unwarranted, in the last three years two Saudi newspapers have either closed or temporarily suspended its operations due to financial difficulties.

However, due to wealth of the GCC governments and its financial interference, it is rare for newspapers in the region to face the risk of bankruptcy. For example, the late King Abdullah of Saudi Arabia paid around $3 million in aid to help the old version of the Makkah newspaper during its economic crisis in 2006 (Aleqtisadiah 2006). As a result of government support and the fact that most of the newspapers in GCC are privately owned and aim to make profit, several scholars argue that there is no indication of the predominance of economic influence in the GCC member state and in particular Saudi newsrooms (Al Kheraigi, 1990: Al-Kahtani, 1999: Al-Shebeili, 2000).

2.7.3. Organisational Impact

Another factor that affects journalism practises in the GCC is the influence of the organisational as a whole, which Hanitzsch and Mellado (2011, P. 407) described as

> "Editorial decision making and management routines and therefore encompass sources of influence that emanate from multiple levels: from within the newsroom (supervisors and higher editors) and from within the media organization (management and ownership)."

The structure of the GCC's newspapers is problematic since it is managed by two teams; one from the editorial side which is usually led by the editor-in-chief, who oversees the contents of the newspapers, and one from the administrative side, which led by the general manger (GM) and is responsible for directing the business side of the newspaper. Both of these individuals report to the chairman of the board, the chairman is usually a high-ranking official and at many times does not consider the newspaper as his top priority (Almaghlooth 2013). This structure has caused dilemmas in how the newspaper is operationalised, which in turn creates a tension in the newsrooms. MaManus (1994) mentioned that commercial news media struggle to combine between serving the public and serving the interest of its owners. For instance, Al-Mashikhi's (2015) study revealed that around 62% of Omani journalists think that the owner of the newspaper is the dominant decision maker for the contents and polices of the newspaper. Half of Omani journalists stated that from their own experience the newspaper's owner intervened in the recruitment process of new journalists, and around 47% of Omani journalists stated that the owners may make decisions that not compatible with the view of the experts in the newspaper. In the same way, Almaghlooth (2013) cited that editors in Saudi newspapers publish certain news stories in order to please the GM and in return they hope for approval in any potential decision they make. Almaghlooth (2013) further added that newspaper editors are unable to run the newsrooms without the support of the administrative management. This is something evident in the disagreement between GM's and editors on the introduction of new technologies to the newsrooms. An illustration of this is the case of the Alyaum newspaper, when "the former editor-in-chief of Alyaum, Sultan Albazie, faced resistance from both management and workers when he tried to introduce new technology to his newspaper after assuming the editorial leadership" (Almaghlooth 2013, P.27). MaManus (1994) highlighted these tensions act as a force driving the two parties apart, causing a lack of communication and resulting in affecting the technical progress of newsrooms. A further example is evident from a study concerning Omani journalists where around 60% found the influence of owners on news organisations to be "extremely" and "very influential" (Al-Kindi and Zahra 2017), while around 50% of Emirati journalists responded the same (Darwish 2017). Based on this, Darwish (2017) asserted that internal factors such as influence of owners on news organisations is in fact more influential than other factors in journalism in the UAE.

The impact of organisations in the GCC newspapers takes different shapes, one of these shapes is the editorial censorship. The senior editorial personnel heavily monitor the contents of their newspapers in order to maintain their positions and protect themselves from punishment and reprimand (Al-Shebeili 2000). Al-Shebeili (2000) added that the ambiguity of media laws in the GCC countries, particularly in Saudi Arabia, has forced editors-in-chief to be cautious and avoid covering critical topics that may irritate the government. Al-Mashikhi (2015) pointed out that 70% of Omani journalists stated that the editor-in-chief monitors all of newspaper's content before it is published, and around 76% of them recognised the existence of gatekeepers in different level of the newspaper. Similarly, Al-Kindi and Al-Syabi (2016) found out that around 77% of Omani journalists thought that the administrative procedures they must deal with hinders to their work more than the actual Omani journalism law. Moreover, 79% of the Omani journalists who took part in the study viewed the editorial censorship as much harsher than the censorship imposed by the law.

Another dimension of the organisational impact is the lack of specialised departments in newspaper organisations; this has negatively impacted on the implementing of new technologies and tools in the newsrooms (Bekhit 2009). Bekhit (2009) further argued that UAE newsrooms lack a special department for infographics, this has led to the absence of specific job descriptions for those who create infographics in the organisation or potential workers who specialise in designing infographics. This lack has led to a lack of the progress in Emirati newsrooms and minimised the use of key skills and technology.

2.7.4. Professional Impact

The last factor affecting news making in newsrooms in the GCC is the impact on journalistic professionalism; this is in fact a result of the aforementioned factors combined. In a study conducted by Pintak and Ginges (2008) around 70% of Arab journalists stated that the lack of professionalism is one of the most significant challenges that they face. Professionalism is a problematic concept as argued by Reese and Cohen (2000) due to the fact that its definitions is often related to specific interests. For example, McQuail (2010) associated professionalism with media ethics and values and how journalists sustain them when performing his/her job. On the other hand, Soloski (1989) argued that professionalism is a tool that news organisations used to control journalists' behaviour in a structured way, which is evident in 'behaviour standards and norms' and a 'professional reward system'. Kirat (1993; 1998) and Weaver et al. (2006) have used a set of indictors to evaluate journalistic professionalism, these include; membership in professional associations, journalism or mass communication degrees, subscriptions to professional journals, heavy media consumption, continuing education and participation in workshops and training courses. Other indicators of professionalism include dedication to a news organisation and its editorial policy, the search for independence and skill development. From the above is clear that the concept of journalistic professionalism encompasses a wide range of journalism values, principles, and ethics.

Most Arab journalists agreed that their mission is to work as a mean of political reform, educate the public, broadcast news for social good and be voice for the poor (Pintak and Ginges 2009). This is corroborated in a study concerning Emirati journalists, where around the half of sample saw educating the audience, influencing public opinion, and promoting tolerance and cultural diversity as "very important" to their role (Darwish 2017). Similarly, most Omani journalists believed the most important role of journalists was to be a detached observer, to advocate for social change and to support national development (Al-Kindi and Zahra 2017).

In terms of ethics, GCC journalists share the same ethics as their counterparts in Western countries such as truth, accuracy, and objectivity. Pintak and Ginges (2009) found that 90% of Arab journalists felts that journalists should always be objective; and they did not see any contradiction between objectivity and the overt support for political and social reform. In addition to the view of journalists, the GCC professional codes have also outlined the importance of journalism ethics, Hafez (2002, P.228) said

> "Many of the assembled codes—for instance, the German, Malaysian, and Saudi Arabian codes—emphasize that the journalist's obligation to report the truth derives from the right of the public to be informed adequately about events and opinions. Factual, correct, and unbiased coverage therefore can be considered a consensual value of journalism that in all codes forms the core and essence of the journalistic profession and distinguishes fiction from nonfiction".

Despite the similarities between these codes, Hafez (2002) claimed that it they were unalike in terms of their implementation and differed in practise from country to country. Mellor (2005) argued that ethical and social responsibility actually obliged Arab journalists not to stir public opinion, but work to maintain the country's stability.

However, the influence of social and cultural factors such as religion and society's norms also impact the level of commitment GCC journalists are willing to show towards journalistic ethics. Zelizer (2005) stated that journalists are a product of the culture in which they operate, and it considered culture as having an important influence on their work. Mellor (2005) and Amin (2002) agreed that Arab journalists see themselves as a means of preserving cultural heritages and serving their society's morals in order to maintain national unity. This is illustrated by the fact that Emirati journalists believe their journalistic roles are in line with the country's media policy (Darwish 2017), while Saudi journalists see promoting Islamic values as the main role of journalism in country (Mellor 2005). A further example is the case of Saudi Arabia where newspapers refrain from covering topics that are considered religiously or socially sensitive such as homosexuality and gambling (Al-Shebeili 2000). Reinisch (2010, P.7) describe this dilemma as

> "Journalists in the Arab world are torn between the principles of Western journalism and the necessities of their cultural, political, religious and economic surroundings. Objectivity, accuracy and balance, the cornerstones of Western journalism, are to some extent incompatible with the authoritarian socio-political structures of the Arab region."

These beliefs have resulted in journalists in the GCC being unable to follow the journalism ethics – something that is considered as one of the main challenges that face Arab journalism (Pintak and Ginges 2009).

These issues have been attributed to the lack of independence and the pressure of self-censorship (Pintak and Ginges 2009). Researchers consider professional autonomy one of the main basic requirements for journalistic practises that enable journalists to perform its social function and serve the public (McQuail 1992; McDevitt 2003; Kunelius 2007; Singer 2007). The lack of press autonomy has a negative effect on the credibility of the news, Saeed (2012) stated that "The credibility of journalism as a profession rests on its independence from any political control. Journalism that is controlled ceases to be a free, truthful and objective voice of the people – the very principles on which the 'fourth estate's' claim to power hinge" (Saeed 2012, P.49-50). In a similar vein, McDevitt (2003) argued that the ability of press to perform its fourth estate role, requires its autonomy from the government, meaning that the government must be unable to influence the news coverage. Furthermore, Alotaibi (2016) argued that the reliance of Saudi media on the government as source of income and information contribute to the weakening of the press and its inability to be independent from the state. Journalists in the UAE and Oman have a low to average degree of professional autonomy (Darwish 2017; Al-Kindi and Zahra 2017). This is illustrated by the UAE's *Al Ittihad* newspaper which has shown a lack commitment to verify any governmental stories that are produced by the national news agency, and it has rarely reviewed any information provided by the state but rather accepted the information at face value (Duffy 2013). Al-Kindi and Al-Syabi (2016) argued that Omani journalists want to replace the administrative control by the judicial control, in order to secure a greater degree of professional autonomy.

The long history of censorship in the GCC countries has resulted in the emergence of a censorial culture among Khaleeji journalists (Amin 2002). Amin (2002) argued that the emergence of this censorial culture is a great example of how effective the GCC governments establish and expand their control over the media system and its personnel. He further states:

> "Concerns over freedom of expression are genuine; the term "responsible freedom"—always associated with self-censorship—is often misused by journalists when they cover issues dealing with the image of the country or national concerns. National security concerns in many Arab countries, for example, encompass far more than military threats from foreign countries. They involve anything that can be considered a threat to the ruling institutions and

their interests, including negative statements about religions or beliefs, Arab nationalism and its struggle, values, and national traditions" (Amin 2002, P. 128).

Rugh (2004) mentioned that governments use anticipatory self-censorship to ensure the loyalty of media system; this has resulted in journalists adapting self-censorship in order to protect themselves. Therefore, the self-censorship has become a part of the daily routine of GCC journalists leading Amin (2002) to describe their stance as a similar stance taken by an authoritarian regime. Sakr (2003) described self-censorship as irreversible and went further to state that it was the worst type of the censorship, which leads to GCC journalists having overprotective attitudes (Amin 2002). Scholars have argued that self-censorship can be attributed to several factors, Azet (1992) cited fear in general, lack of confidence and perceived incompetence in political matters as the causes of self-censorship. While Pintak (2010) stated that each news organisations in the Arab world have it redlines that are defined by either the political environment or by the editorial team. Duffy (2013) argued that journalists exercise self-censorship to avoid crossing these redlines in order to protect themselves. Reinisch (2010) claimed that the GCC government use these redlines to gain indirect control over media in the region, these are coupled with the authority to distribute newspaper and practices licenses; all of these give governments numerous tools for controlling the media. Awad (2010) stated that censorship rules in Saudi Arabia are unwritten and unclear, leading to complications in the journalists' job. For example, senior editors may reject an article for no apparent reason, making the journalist and his follow journalists unwilling to write similar stories to the one that was rejected in the future (Awad 2010). In the same way, 70% of Omani journalists confirmed the existence of self-censorship in their work, even stating that it is stronger than government censorship (Al-Kindi and Al-Syabi; Al-Mashikhi 2015). Omani journalists cited the media law in the country as the main catalyst of the growing pressure of self-censorship in their daily work (Al-Mashikhi 2015).

3. Data journalism

Despite the "explosion" of data journalism literature and several attempts by scholars to define this emerging field of journalism, there is no agreed upon definition among researchers (Loosen et al. 2017; Stalph 2017; Lowrey and Hou 2018). Scholars have attributed the lack of an accepted definition of data journalism to the wide range of skills and forms used in data journalism; this in turn poses a challenge for researcher who want to clearly define it (Lewis and Waters 2017). As the aforementioned epistemological ambiguity and the tendency to define data journalism is based on its relationship with other concepts and practices, I will provide several existing definitions of data journalism.

One of the main concepts that is usually associated with data journalism is its relationship with society and how data journalism can serve the public good and strengthen the government's accountability. The French professor Alain Jonnés defines data journalism as *"A form of rich media with an added dimension: it implies a return to the factual, to the investigative. It's about interrogating the data, finding and formatting the relationships. Data journalism is a tool of democracy"* (Mair and Keeble 2014, P.28). In a similar vein, Stray (2011) defines data journalism as a process of collecting, analysing, communicating, and publishing data in the interest of the public.

Another practice that data journalism is often connected with is the role of data journalism as a means to tell a story. Bradshaw argued that data can be the source of the story, or at times it may be the tool that tells the story (Gray, Bounegru and Chambers 2012). Similarly, Simon Rogers (2013) reaffirms the definition of data journalism as a storytelling tool by defining it as the utilisation of numbers to find and tell a story.

However, these definitions of data journalism failed to distinguish data journalism from similar practices in journalism such as CAR and did not expand on the overlap between the two practices. Hence, several scholars have attempted to focus on this failure when trying to define data journalism and clearly set apart these practises from each other. This new wave of definitions has placed emphasis on the fact that data journalism pays more attention to the data and distinguishes data journalism as a workflow rather than a technique. Liliana Bounegru, from the European Journalism Centre, defines data journalism as “CAR is a technique for gathering and analysing data as a way of enhancing (usually investigative) reportage, whereas data journalism pays attention to the way that data sits within the whole journalistic workflow” (Gray, Bounegru and Chambers 2012, P.21). While Simon Rogers noted that data journalism in its current form is a modern version of the older practice of CAR, and defined it as “A field combining spreadsheets, graphics, data analysis and the biggest news stories to dominate reporting” (Rogers 2013, P.30). In a similar vein, Mirko Lorenz, from the European Journalism Centre, described data journalism a journalistic workflow that is capable of analysing, visualising, and telling stories, unlike CAR, which is mostly used with computers to search databases for a story’s sake (Lorenz 2010). Furthermore, Paul Bradshaw, one of the pioneering scholars of data journalism, highlighted the difference between data journalism and the rest of the types of journalism as the ability of data journalism to combine “traditional ‘nose for news’ and ability to tell a compelling story, with the sheer scale and range of digital information now available” (Gray, Bounegru and Chambers 2012, P.2). The availability of digital information and computerisation of newsrooms has led to a dramatic increase in the use of data journalism in newsrooms over the last two decades. Therefore, newsrooms in the US and the UK, such as The New York Times and The Guardian began to hire programmers to work in their newsrooms, requiring them to produce news applications and news content (Daniel and Flew 2010; Royal 2010). Not only do the newsrooms hire programmers to work in their newsrooms, but they have also created a special department to produce innovative content and technologies they can employ in their news stories (Daniel and Flew 2010; Royal 2010).

Despite the expansive definitions, data journalism is either defined through its form or process, with two common elements in its definitions. Zamith (2019) describes these two elements as “(1) quantitative information should play a central role in the development or telling of the story and (2) there should be some visual representation of the data referenced in the story. p 473”. Loosen et al. (2017) added two additional elements: participatory openness and open data and open-source approach. However, Zamith (2019) downplayed the necessity of Loosen et al. (2017) elements, arguing that its existence on exemplary works of data journalism is limited (see Borges-Rey 2017; Stalph 2017; Young et al. 2017)

In this context, the definitional challenges of data journalism have imposed difficulties for news organisations and journalists themselves to set the boundaries for this emerging field of journalism. These difficulties include the following: the status of data journalism in the organisational level, professional level, and its content.

Most data journalism studies, in particular that located in the European countries, have described the implementation of data journalism in newsrooms as slow, especially in non-elite news organisations (Cheruiyot et al. 2019), attributing this to the lack of special skillsets that are required to produce such content (De Maeyer et al. 2015). In a similar vein, newspapers in the UK and Finland rely on third party actors to produce their complex projects, due to the lack of equipped personnel to do the job (Uskali and Kuutti 2015). It is for this reason scholars have argued that that the introduction of data journalism in countries, such as Belgium, Netherlands and the UK face several obstacles that impede the adoption of data journalism; most of these obstacles arise from the lack of “transformer skills” such as programming, analysing and designing that traditional journalists working in small news organisations usually lack (Smit et al. 2014; De Maeyer et al. 2015; Borges-Rey 2016). Moreover, data journalism in Sweden and Norway is still in its early stages and the adoption of this form of news is usually met with curiosity and scepticism, and its complexity has been the reasons for a limited and often rudimentary adoption (Appelgren and Nygren 2014; Karlsen and Stavelin 2014).

On a professional level, journalists are confused by the wide range of skillsets that are required to produce data journalism content; this was reflected in their assessments of its integration into news practise, where some of them believed data journalism to have been fully integrated while other were less certain (Borges-Rey 2016; Felle 2016). In addition to this, journalists have mixed opinions of the purpose behind news organisations implementing data journalism into their newsrooms. Some journalists viewed it as an upgrade for journalism (Bakker 2014), while others saw it as “a continuation of journalistic work practise” (Karlsen and Stavelin 2014, P.44). Moreover, some journalists viewed it as way to secure their job (Shirky 2014; Stalph and Borges-Rey 2018), while others saw it as a sophisticated product that limited personnel in the newsroom were capable of producing (Tabary et al 2015).

In the contents level, the challenges associated with the definition have caused a variety of classification of data journalism contents within news outlets. As a result of this, scholars who want to analyse this content have been faced with an analytical difficulty and struggled to ascertain data journalism content. For instance, Stalph (2017, P.6) feels that data journalism articles that are appearing on “designated data journalism landing pages” of websites should explicitly labelled as such to help readers know it is data journalism. Some have used the data journalism awards as a criterion to help identify data journalism content (Young et al. 2017), while others follow a systemic approach to segregate data journalism from a general pool of content (Knight 2015; Tabary et al 2015).

3.1. Data journalism in newsrooms

Despite the aforementioned the definitional challenges that may hinder the introduction of data journalism in newsrooms, scholars have argued that the use of data in journalistic practises has numerous benefits.

The era of the mainstream media having superiority as the predominant news maker and distributor has come to an end, with new competitors such as social media platforms and citizen journalists changing the media landscape through their work and content. In this social media era news is reported as soon as it happens from different news outlets, and broadcasters have access to a mass audience at their fingertips. The journalism industry has searched for any competitive advantage that may help them regain their predominant role in disseminating the news. This has led data journalism to become a relative advantage by enabling journalists to gather, filter and visualise what is happening (Gray, Bounegru and Chambers 2012). Data journalism has altered the journalists' job by allowing journalists to tell what certain developments might mean, rather than being the first to report a story (Gray, Bounegru and Chambers 2012). Data journalism has allowed reporters to discover hidden stories in datasets (Borges-Rey 2017), while enabling them to simplify and personalise the complex data for their audience's consumption (Gray, Bounegru and Chambers 2012). Furthermore, data journalism has helped to ease the journalistic role of a watchdog, since it allowed journalists to use big data sets to uncover any wrongdoing by government agencies (Felle et al 2015). Likewise, data journalism can enhance news objectivity because of its ability to validate stories through data analysis without relying on other sources such as governmental sources, coupled with the audiences' perception of accepting number as facts (Zander and Moserman). Likewise, scholars have argued that data journalism can be a means to solve issues in the news making process, such as by information asymmetry, independent interpretation of official information and by using data to report the unreported issues that require more time and manpower to report (Gray, Bounegru and Chambers 2012).

Moreover, the adaption of data journalism can be a means of enhancing the transparency of the journalistic process. This is because when news outlets show its audience the data they used in their stories; it gives them the chance to analyse it for themselves (Kalatzi et al. 2018). Furthermore, the visualisation of raw data gives audiences the ability to explore and engage with data they need (Aitamurto et al. 2011; Lesage and Hackett 2014). As a result of this transparency, the public may restore their lagging trust in journalism which has long been in jeopardy in recent years (Kalatzi et al. 2018). The ideal form of data journalism enhances transparency in the journalistic process, which leads to more accountability and thus reaffirms the newspapers legitimacy among readers (Allen 2008; Lewis and Westlund 2014).

Another benefit of using data journalism in newsrooms is the fact that it is considered as the future of journalism (Lewis and Westlund 2014), and it is an innovative and trendy way to cope with the everchanging journalism profession (Gray, Bounegru and Chambers 2012). Due to its popularity, news organisations have adopted it to stand out from the competition in the industry, and journalists themselves now see data journalism skills as a necessity for upholding their own role in newsrooms (Gray, Bounegru and Chambers 2012). Furthermore, with downsizing and the changing newsroom environment in recent years, the hiring process and person specification for journalists has changed, and journalists who can bring data skillsets to the table have become very much sough-after (Engebretsen et al. 2018).

Zhang and Feng (2018) summarised the value of introducing data journalism in two aspects: it gives adapter a relative advantage and it is compatible with the rapid development of the media landscape. In terms of its relative advantage, data journalism provides a value-added practice to mainstream media; this is evident in its ability to combine traditional the journalistic role and the utilisation of new methods to produce persuasive and attractive content (Zhang and Feng 2018). Regarding its compatibility, Zhang and Feng (2018, P.1293) described data journalism as a great contributor that has enabled journalist to keep up with the evolvements taking place in the media landscape, stating "providing an active response to the digital wave and demand for innovation and change and enabling opportunities to achieve social recognition and upward mobility".

3.2. Data journalism forms, approaches, and integration in newsrooms

The introduction of data journalism practises into newsrooms follows different level of adoption. The adoption is affected by several elements, such as the size of the news organisations, number of employees and the access to resources and tools. These levels are depicted in articles related to the forms of data journalism, the approaches of newsrooms to producing data journalism and how data journalism has been integrated into newsrooms. Due to variety in the level of adaption of data journalism, scholars have examined these elements in order to understand how data journalism functions within newsrooms.

3.2.1. Data journalism forms

In terms of form, despite the publicity surrounding data journalism content as bigger, more attractive, and advanced, there is also a great deal of content that is simple in its visualisation and interactivity. In both forms data is still seen as a niche skill, despite the disparities of the content (Wright and Doyle 2018). Uskali and Kuutti (2015) were two of initial scholars who discussed the form of data journalism or streams as they called it. They identified two forms of data journalism: 1) investigative data journalism (IDJ) B) general data journalism (GDJ). After identifying these two forms, they listed three main differences between the two. Firstly, in IDJ journalists have time on their hands when it comes to producing their data stories and they can at times take months or years. In contrast, journalists working on GDJ content are not given this luxury and are required to produce their content with hours or few days. Secondly, in IDJ content, journalists usually work in teams, and the content requires advanced data skills to produce, such as coding. On the other hand, GDJ requires basic level data skills, and its content can be produced by individual. Thirdly, in IDJ the story's topic and the angle from which it will be reported determines the data to be collected, while in GDJ, databases are the starting point for the story, therefore, the story's topic and viewpoint are determined based on the content of the database (Uskali and Kuutti 2015).

Data journalism content in mainstream media has diversified into three forms, according to Borges-Rey (2016, P.841): "(1) a daily, quick turnaround, generally visualised, brief form of data journalism; (2) an extensive, thoroughly researched, investigative form of data journalism; and (3) a light, editorialised, entertaining, often-humorous, gamified form of data journalism".

The daily data journalism content often uses small amounts of data visualisation and interactivity, if any at all (Wright and Doyle 2018). Interactivity in particular seems limited in day-to-day data journalism content, even if some of the contents are award-wining works (Loosen, Reimer, and De Silva-Schmidt 2017; Ojo and Heravi 2017; Stalph 2017). This limitation was described by Appelgren (2017) as an "illusion of interactivity", scholars attributed the lack of interactivity to the difficulties in adapting it across platforms (Cantarero et al. 2017). The daily data journalism content tends to have simple data visualisation, this is especially true for non-elite news outlets. This lack of sophisticated data visualisation has been attributed the to the limited software capability and lack of technological ability of journalists working on such content (Boyles and Meyer 2017; Engebretsen et al. 2018; Wright and Doyle 2018). In summary, the everyday data journalism tends to use uncomplex data visualisation and interactivity, if any. This is explained by the fact that non-elite news organisations have access to limited resources and tools that are required to produce such content.

Despite Borges-Rey (2016) classification of the forms of data journalism in the UK, the light form of data journalism (soft news) appears in newspapers in the USA. According to Zamith's (2019) study on day-to-day data journalism in the New York Times and the Washington Post, around 31% of the New York Times' content was classed as soft news, while 25% was classed as soft news for the Washington Post. Although, both soft and hard news content in the day-to-day data journalism in the New York Times and the Washington Post use an unsophisticated form of data visualisation and low level of interactivity, they are both compatible with the form of day-to-day data journalism content put forth by Borges-Rey (2016).

3.2.2. Data journalism approach

The research around data journalism practices in newsrooms has revealed different approaches to data journalism production, however there are two predominate approaches that are most common: the teamwork approach and the do-it-yourself approach.

The teamwork approach can mean there is a designated team within newsrooms containing on average two to four personnel skilled in journalism, development, and design. This team is responsible for producing data journalism content (Zanchelli and Crucianelli 2012). The team approach can also mean there is no designated team dedicated specifically to producing the data journalism content, however there is a collaborative effort among journalists in producing data journalism content (Loosen et al. 2015). Although the teamwork approach can take two different forms, the most popular form among well-resourced news organisations such as The New York Times is having a dedicated team work on creating the content (Wright and Doyle 2018).

The do-it-yourself approach means that a solo journalist singlehandedly attempts to conduct most or all steps that are required to produce data journalism content (Wright and

Doyle 2018). The backbone of this approach is the availability of open-source tools, such as Google Maps. Despite the lack of specialised resources in this approach, it has resulted in great success and popularity (Young et al. 2017). This can be seen by the fact that 9 out of 26 Canadian finalists and winners in major national and international awards for data journalism between 2012 and 2015 used this do-it-yourself approach to produce their content. This number increased to 15 out 26 for projects that involved two journalists working on it (Young et al. 2017). Similarly, this individual approach has become the main producer of daily data journalism as shown by Stalph's (2017) investigation which found that 60 % of the content of quality news websites in Europe were produced by one journalist using the do-it-yourself approach.

3.2.3. Data journalism integration

Embedding data journalism practice into newsrooms follows several steps; these steps are unique to each newsroom. Boyles and Meyer (2017) listed four steps that allow newsrooms to integrate data journalism practices into newsrooms. These steps follow a liner path which helps newsrooms to implement and expand their data journalism practices (Boyles and Meyer 2017). The four steps are: exemplary effort, solitary practice, embedded collaboration, and data unit. Exemplary effort refers to the newsroom's existing personnel, who work on data content in addition to their assigned work. These workers are usually data advocates and work on data content in their spare time, they also usually collect data content that is related to their assigned work. Solitary practice is where newsrooms recruit data journalists and assign them to data content full-time, while also asking them to work on a variety of story subjects across the newsroom. Embedded collaboration is where the solitary practitioner identifies data advocates who are part of the newsroom's existing personnel and seek their collaboration to form a partnership that allows the newsroom to allocate simple data content to other newsroom staff while enabling the data journalist (solitary practitioner) to work on special or complex data content. Finally, data unit means that newsrooms establish a data unit within the newsroom structure, ensuring that it is independent from any other tasks unrelated to data journalism content. Despite outlining these four steps, Boyles and Meyer (2017) argued that the existence of investigative units in newsrooms will allow a natural and easy transition when implementing data journalism practices, since data journalists are perceived as an extension of the work done by the investigative units (Boyles and Meyer 2017).

3.3. Data journalism popularity factors

Despite these issues, the use of data journalism has expanded dramatically in the newsrooms, and it continues to gain popularity worldwide. Simon Rogers (2013) sees the popularity of data journalism as a result of the global transparency movement, which has changed the perception of data through four factors: first, the availability of data on the internet. This factor has become more important in recent years due to the vast amount of leaked data that can be obtained on the internet, such as the Panama Papers and WikiLeaks. In addition to this, a lot of governmental data has been made available online by government agencies, this includes www.data.gov and www.data.gov.uk. This data has been available online as governments attempt to become more open and transparent (Flew et al. 2012). Furthermore, data has also become available online through several non-governmental organisations such as the Bureau of Investigative Journalism, and through several private entities, such as the World Bank (Aitamurto et al. 2011).

Second, the usability of data, which refers to the quality of data itself. The quality of the data is divided into two parts: the accuracy of data and the format of the data. The accuracy of data means that datasets should be free from any error that may undermine its credibility (Aitamurto et al. 2011), whereas the format of the data means that the data should be machine-readable data (Gray, Bounegru and Chambers 2012). When considering the advances in technology, data has become more useable, giving journalists the ability to benefit from online tools to carry out fact-checking and to convert the format of datasets to a machine-readable format.

Third, the improvement in the understanding of the data by utilising data visualisation techniques because data visualisation enables readers to gain a better understanding of the data. Through data visualisation, the readers have the capability to comprehend the patterns and trends within the data, which they may not necessarily understand with other formats of storytelling (Gray, Bounegru and Chambers 2012).

Lastly, the great achievement of stories in which data played an essential role. Examples of these stories can be found in the work of The New York Times, The Guardian, Der Spiegel's Afghan war logs and the work of Heather Brooke in the United Kingdom parliamentary expenses scandal.

Furthermore, scholars have credited the increase of data journalism practices to the emergence of an "open data" and "open source" culture, where data has become more accessible and sharable. In addition, journalists are able to use free tools to analyse and visualise data (Gynnild 2014), such as Google Fusion Tables which is a free web application that allows users to "gather, visualize, and share data tables" (About Fusion Tables - Fusion Tables Help 2017). Another free tool is OpenRefine, which allows users to clean and transform data from one format into another (OpenRefine 2017).

In addition to this, the open data movement is one of main factors that contributed to rise and expansion of data journalism practises. This movement is a global movement that began with governmental initiatives in Western countries. Rogers (2013) described this movement as a means government use to enhance their transparency towards its citizens, while Felle et al. (2015) viewed it as a way to maintain government accountably and improve its services and catalyse economic and social growth. Journalists, coders, news organisations and

NGOs were among the stakeholders who influenced the open data movement when they demanded the releasee of governmental data or requested it via the Freedom of Information Act (FOI) (Rogers 2013). These demands were described by Relly and Sabharwal (2009, P.150) as "telecommunications infrastructure and free press influenced the perceptions of government transparency in a positive and significant way".

However, not all available governmental data is open data, Rogers (2013) defines it as the availability of information to everyone in a machine-readable format that allows people, especially data analyst, to work with it. Schellong and Stepanets (2011) listed eight principles that define whether data is open or not. These are:

"1. Completeness. All public data are made available. Public data are data that are not subject to valid privacy, security or privilege limitations.

2. Primary. Data are collected at the source, with the finest possible level of granularity, not in aggregate or modified forms.

3. Timeliness. Data are made available as quickly as possible to preserve the value of the data.

4. Accessible. Data are available to the widest range of users for the widest range of purposes.

5. Machine-readable. Data are reasonably structured to allow automated processing.

6. Non-discriminatory. Data are available to anyone, with no requirement of registration.

7. Non-proprietary. Data are available in a format over which no entity has exclusive control.

8. License-free. Data are not subject to any copyright, patent, trademark or trade secret regulation. Reasonable privacy, security and privilege restrictions may be allowed" (Schellong and Stepanets 2011, P.11-12).

3.4. Data visualisation

Data visualisation is one of the main elements of the data journalism process. Previous studies have indicated that typical data journalism contains data visualisation (Parasie and Dagiral 2012; Tabary et al. 2015; Loosen et al. 2017; Stalph 2017;). Data visualisation involves the use of graphs, charts, and maps as a way of communicating data content (Segel and Heer 2010). The visualisation of data allows news organisations to offer engaging content for complex data, helping to elucidate the relevancy of the story (Gray, Bounegru and Chambers 2012).

Card (2012) defined data visualisation as "The use of computer-supported, interactive, visual representations of abstract data in order to amplify cognition" (Card 2012, P.520). The purpose of data visualisation is the use of graphical means to offer clear and effective information. Cleveland (1994) argued that "The human brain is more able to identify and comprehend relationships and patterns if data is encoded into visual forms. Graphs allow us to explore data and observe patterns that no other approach can achieve" (Cleveland, 1994, P.5). Data visualisation not only has the ability to simplify the data, but it can also make previously unnoticed numbers and numerical data more recognisable (Dur 2012). In a similar vein, Houston (2010) argued that data visualisation can enhance the role of journalism as a watchdog, he stated "Journalists, computer scientists, and developer working together to seek large government data sets in order to detect favouritism, incompetence, and corruption through the visualization of data" (Houston 2010, P.51). Moreover, news outlets use data visualisation for two main reasons: it can be a means of presenting data or it can enable the exploration of data (Van Wijik 2005). Likewise, scholars have argued that data visualisation content has the capability to attract news audience, and it allow the integration of big data into the news (Schroeder 2004; Smit et al. 2014).

Scholars have attributed the rise of data visualisation practises to several factors: first, the introduction of visual storytelling techniques that have appeared as a response to the digital transformation of journalism. This transformation has convinced media outlets to adopt this form of storytelling, in order to keep their digital, savvy audiences engaged (Weber and Rall 2012). Secondly, the emergence of big data has imposed a challenge for journalists when telling a story that includes big data, data visualisation allows them to provide this big data in the form of digestible content to its readers (Segel and Heer 2010). Thirdly, technological advancement has enabled news organisations to include data visualisation into their news stories since it has made it easier to produce the data visualisation content (Smit et al. 2014). Lastly, news organisations' recognition of data visualisation as a tool of storytelling has contributed to its rise; this is reflected in the hiring of a designer to work on data visualisation content (Schroeder 2004; Segel and Heer 2010; Giardina and Medina 2013; Siricharoen 2013; Dick 2014).

3.5. Data journalism challenges

3.5.1. Challenges related to the practise.

Data journalism practises encounter several challenges that prevent journalists from utilising data journalism effectively. While some of these challenges are common to all newsrooms globally, the structure of media systems in GCC countries provides unique challenges to data journalism practises. Fink and Anderson (2014) found that the lack of personnel, tools and time are the main challenges facing data journalism practices in newsrooms. The lack of personnel who work with data in newsrooms is considered a challenge, since newsrooms are unable to hire data journalists due to the fact that more often than none, under-qualified applicants to apply for the posts. In addition to this, the economic pressures newsrooms face as a result of the economic downturn have meant newsrooms are unable to hire and pay for highly qualified staff (Fink and Anderson 2014). Furthermore, there is a lack of qualified journalists who at competent when working with data; data journalists should be data literate and have a basic understanding of programming as a minimum (Zander and Mosterman, 2014); having these skillsets will enable journalists to interpret data and discover any patterns within them. Another challenge data journalist face, especially those working in small organisations, is the limited access to tools and software they have. Specialised tools and software are essential when producing data journalism content; as a result of this, many of these small organisations are forced to depend on a third party to produce data journalism content (Fink and Anderson 2014). Furthermore, creating data journalism can be an extremely lengthy and laborious process. Consequently, data journalists tend to choose data stories that require less time to produce; this is usually stories based on data that involves minimal time to clean and validate (Fink and Anderson 2014).

Veglis and Bratsas (2017) added to these the challenges by suggesting the obstacles that data journalism faces fall into six categories; lack of time, lack of resources, lack of adequate knowledge (e.g. of tools or personal skills), lack of adequate publishing infrastructure (e.g. content management system fit for standard post only), lack of management support and lack of interest from staff.

3.5.2. Challenges related to data.

Despite the fact that we are in an open data era, data is still not completely open or accessible. A lot of data still requires use of the Freedom of Information Act to obtain as the governments is hesitant when it comes to releasing certain data. Even if the data is publicly available, it may not be usable in all circumstances because of the format the data is stored.

When the format of the data is ambiguous, it will require a great amount of effort to make it a useable and worthwhile (Aitamurto et al. 2011).

Another challenge is the issues surrounding databases which are at times the main source of data news stories, these issues have existed since the invention of CAR and are still present. Houston (2018) listed several problems with databases, these include: incomplete data, non-standardised data, data entry errors and wrong code. Adding to these, DeFleur (1997) highlighted other issues regarding databases, stating "Not all values are recorded for each variable, not all variables are complete for all years, variables do not always have the same meaning" (DeFleur 1997, P.139).

Despite the prevalence of data, it is uncommon to find data that does not require cleaning (Vallance-jones and McKie 2009). The cleaning process involves removing errors, formatting irregularities, and identifying missing values; this is a time-consuming process and requires a basic knowledge of data literacy and data management tools (Halevy and McGregor 2012). Having uncleaned or dirty data may undermine the truthfulness of the information (Craig et al. 2017) and may lead to flawed analyses (Messner and Garrison 2007).

Another challenge that data journalism practises have faced is the accuracy of data; in some cases, datasets contain errors or have been manipulated by the source. Therefore, data journalists should be able to discover any issues with the data, as inaccurate data could undermine the trustworthiness of reporting (Aitamurto et al. 2011).

However, it is important to note that each newsroom experiences these challenges differently; this could be due to the size of the newsrooms or the number of staff working in it. Furthermore, some data journalists have an advance skillset that enables them to overcome some of these challenges. For instance, a data journalist may have received the requested data from an official in the form of a photocopy, in order to make it difficult for him/her to read and thus making it practically unusable. Nevertheless, depending on the journalist's knowledge of computer software, they may have the skills that allow them to use optical character recognition software to convert the photocopied data into an electronic form (Fink and Anderson 2014).

3.6. Ethical issues regarding data journalism

Despite its rapid growth in newsrooms, data journalism still faces some ethical issues regarding its practises. These ethical issues are mainly concerned with the accuracy of data used in producing data journalism content as data can be used out of context, easily manipulated or misinterpreted. In some cases, journalists have been known to treat governmental data as facts, ignoring the necessity of verification and fact checking and simply taking the data at face value (Bradshaw 2014). The accuracy of data is interlinked with its truthfulness, therefore reporting inaccurate data can lead to spreading harm (Craig et al. 2017). When data is not adequately checked beforehand, any inaccuracies can easily deceive readers and undermine the objectivity of the news by spreading false news and misinterpreted results (Daniel and Flew 2010). Meyer (2002) stated that "Numbers are like fire. They can be used for good or for ill. When misused, they can create illusions of certitude and importance that render us irrational" (P. 19). Bradshaw (2014) argued that it is sometimes difficult to verify governmental data due to its sheer size and nature, putting journalists in a quandary where they must make the choice between publishing inaccurate data or serving the public good.

In the age of mass data gathering, scholars have highlighted the issue of privacy as an area of concern. Open government datasets can sometimes include personal information that may infringe the rights of individuals, especially when used in an illegal or unethical way (Borgesius et al. 2015), such as in the case of Cambridge Analytica. Governmental regulations have failed to keep up with the private sector's ability to accumulate and process information for its own use, which sometimes includes personal information that may impact individuals

(Mayer-Schönberger and Cukier 2013). This fact that was pointed out by a big data report submitted to President Obama in 2014, the report stated:

> "In addition to creating tremendous social good, big data in the hands of government and the private sector can cause many kinds of harms. These harms range from tangible and material harms, such as financial loss, to less tangible harms, such as intrusion into private life and reputational damage" (Podesta et al. 2014, P.51).

Also, the context of the data in data journalism is an important aspect that journalists need to seriously consider when reporting data stories, while accounting for elements that may impact the context of the data, such as the size of population and differing demographics (Bradshaw 2014). Moreover, data visualisation should be clear and have metadata to avoid any misinterpretation (Bradshaw 2014), also journalist should use captions to provide clarity for the data visualisation (Cleveland 1994).

Predictions are also another important ethical issue that concerns data journalism and causes the dilemma of choosing between accuracy and minimising the harm (Bradshaw 2014). Silver (2012) argued that predictions related to human activity, such as political voting, may alter who people's actions and may therefore lead to different outcomes in voting results. To further illustrate this point, Silver (2012) provides the example of CNN's poll of Iowa Republican caucus race in 2012, where CNN was the only news outlet that indicated Rick Santorum had accumulated a significant 16% of the vote with other news broadcasters not indicating this figure. As Santorum was a beneficiary of favourable media coverage, this caused some voters to abandon candidates with similar ideology like Michele Bachmann and Rick Perry and give their vote to Santorum instead. This example highlights why Silver (2012) described the publication and publicising of predictions as a dangerous process that can lead to harm, he further stated "If you can't make a good prediction, it is very often harmful to pretend that you can" (Silver 2012, P.230).

Another great example of the unreliability of predictions is the election of President Trump, which Lewis, and Waters (2017) described as a disaster for predictions and the day when data journalism went on trial. Former New York Times editor Bill Keller described journalists' failure to recognise the potential of Trump as wishful thinking rather than predictions, he argued that Trump's victory should encourage journalists to treat data with scepticism while maintaining traditional journalistic methods. He also stated "Political journalism used to be more like anthropology — relying on field work, on long, in-depth interviews. I fear that kind of reporting is now regarded as "anecdotal" (Keller 2016).

3.7. Data journalism in the GCC

Studying data journalism in the GCC countries is important for several reasons: firstly, most data journalism research has focused on the context of North America and Europe and there lacks a body of research dedicated to the GCC region (Fink and Anderson 2014; Stalph and Borges-Rey 2018). Secondly, data journalism has the ability to allow Arab journalists to report on issues that were previously off limit. An example of this is when newspapers in Makkah highlighted the misleading offers of the Public Pension Agency, which is a governmental agency, and its difference from the content of the agency website to the actual offer from its partners (Alhussaini 2016). A third reason why studying data journalism in the GCC context is because data journalism practices in the Arab world, especially in the GCC countries, are still underexplored and lack robust academic scholarship, despite its prevalence in newsrooms across the region.

Journalism studies outside Western countries tend to apply Western values such as western ideals of individuality and liberal democracies as universal values (Hanitzsch 2018).

These studies at times seem to neglect some fundamental obstacles that Arab journalists face which their western counterparts may not, such as governmental and social pressures (Al-Najjar 2011). Wright et al. (2019) suggested that scholars need to be careful when writing about journalism practices beyond Western context, in order to avoid three common pitfalls. First, scholars need to refrain from idealising the Western model in comparison to other parts of the world. The labelling of the Western model as the best or more advanced has driven other parts of the world to adopt the Western model in order to be more and seem modernised (Escobar 1995; Nyamnjoh 2005). Second, researchers should not construct a simple binary split between two homogenised categories; the West and the rest (Wang 2010); this is an important aspect to bear in mind in order to de-centre the West (Curran and Park 2000; Volkmer 2002; Waisbord 2019). Third, scholars need to be careful not to merely place emphasis on one means of change within journalism, such the new communication technologies (Wright et al. 2019), but rather they should consider other aspects too, such as the journalistic environment where the journalists work (Gynnild 2014).

In the context of data journalism, detaching it from the Western context seems a problematic task, since the development of data journalism was based on several aspects that occurred initially in the West, such as the social progressive movements in the USA (Anderson 2018) and the open data and open-source culture (Rogers 2013). Furthermore, the practise of data journalism beyond the Western context reflects the Western model, Wright et al. (2019, P.1296) stated “The practice of data journalism in such countries is also powerfully shaped by the outward flow of ideas, practices and structures from America and Europe”. Scholars have attributed this reflection to the fact that data journalism initiatives are mostly sponsored by Western agencies (Baack 2017; Cheruiyot and Ferrer-Conill 2018), for example the USA embassy in Nigeria offered data journalism training for Nigerian journalists in 2017 (Mutsvairo 2020). Moreover, Western norms still underpin the work of data journalists outside the West, since most of the communication technologies that enable them to produce data journalism content were invented or developed in the West (Petre 2018; Zamith et al. 2019).

Data journalism in the Arab world is yet to be fully adopted by the mainstream media in the region, and there is a severe lack of educational courses across media collages in the region (Fahmy and Attia 2020). Private Arab media organisations such as InfoTimes, the Arab Data Journalists Network (ADJN) and Arab Reporter for Investigative Journalism (ARIJ) were the driving force behind implementing data journalism in the Arab media landscape. These organisations launched workshops to train young journalists (Fahmy and Attia 2020) and publish data journalism projects (Lewis 2020). These initiatives have contributed to the rise of journalists' awareness of the importance of data journalism; this is evident in the interest of Arab journalists with regards to data journalism and their drive to know and learn more about the concept (Fahmy and Attia 2020). An example of the drive and passion of Arab journalists to work with data is evident when looking at their contribution to using data from the Panama Papers to investigate and uncover stories related to their region (Bebawi 2020).

Open-source environment is one of the main fundamentals that has shaped current data journalism practices. It is centred around collaborative work among several sectors so as to add capacity, local or regional expertise from specific countries, and so that any unforeseen issues can be overcome. Some of the newsrooms found that collaborative work can potentially allow them to overcome challenges, such as the lack of resources and personnel (Borges-Rey 2016). The collaboration between journalists and people from different professions, such as programmers, developers, designers, computer scientists and statisticians can enhance data driven stories, also it may pave the way to accessing data that was off limit or inaccessible in the journalist's home country. This was evident in the case of Panama Papers, when Arab journalists were able to investigate and uncover stories relating to their countries as they found and gained accessed the required data to do so (Bebawi 2020).

Therefore, Arab journalists can overcome the scarcity of data by relying on collaborative work, as well as benefiting from third party entities to help them produce their data content.

There are some Arabic data journalism initiatives (ARIJ MENA's Research and Data Desk Project and InfoTimes) that embrace the collaborative nature of data journalism and enable Arabic data journalists to access data and benefit from open-source tools used in the data journalism production. Also, some of these initiatives offered a training course for data journalists in the region, as well as celebrating outstanding data projects in the region (Bebawi 2020). However, these initiatives are not fully recognised by mainstream media in the Middle East, which in turn hinder their collaborative effort between them and the news outlets in the region.

Despite the interest of Arab journalists in adopting data journalism, they face some obstacles that hinder the process of its implementation. According to Lewis and Nashmi (2019) government restrictions in accessing data, censorship and freedom of expression all work together to hinder data journalism from thriving in the region. Adding to this hinderance is the reliance of Arab media organisations on the ruling regime as a mean of financial support, restricting their autonomy and ability to evolve and adopt new techniques. Fahmy and Attia (2020, P.17) argued that:

> "The business model of most Arab media organizations, which follow certain financial or political agendas, makes these organizations less interested in raising the quality of the content provided to the audience, and so they do not care to adopt new methods in presenting in-depth and data-driven content".

Amer Eleraqi, a data journalist and the founder and director of InfoTimes, argued that media organisations in the Arab world are keener to please their owners or financial supporters more than their actual readers, therefore these news organisations pay no attention to improving its content (Fahmy and Attia 2020). Institutional obstacle is another obstacle that restricts the spread of data journalism in the Arab world. This issue is caused by the lack of interest shown by Arab media organisations in training its staff to be able to work with data and the general work culture in media organisations in the region (Fahmy and Attia 2020). Alongside this is the issue of the state's control over media organisations in the region. Governmental involvement and control have resulted in a lack of quality independent journalists (Pintak and Ginges 2008), and caused journalists to become disillusioned to implementing a new style of journalism, such as data journalism since it requires a great amount of self-development and self-motivation (Lewis and Nashmi 2019; Fahmy and Attia 2020). Consequently, in Arab newsrooms it is difficult to find a suitably qualified data journalist who has the ability to analyse data, create data visualisation and interactive data content (Lewis 2020).

The success of data journalism as a means of storytelling has convinced newsrooms around the globe into adopting this new form of storytelling in their coverage. Despite its popularity, data journalism is still considered in its early stages in GCC newsrooms, as these newsrooms focus on infographics and simply translate the content of data journalism rather than produce their own. As a result of more advanced technology, competition between newspapers, the impact of globalisation and the internet, the utilisation of infographics has increased dramatically in Emirati newspapers (Bekhit 2009). However, among the newspapers that adopt this form of storytelling, certain patterns and trend can be seen. These patterns include the fact that newspapers typically rely on outside sources to obtain infographics packages, this is particularly the case for news agencies like Reuters, AFP and AP. Newsrooms in the GCC also tend to minimise the number of infographics that are published per day to two or three, with the content of these infographics mostly being translated to Arabic (Bekhit, 2009).

The emergence of data journalism content in the GCC in the form of infographics, is not unique to this part of the world. For instance, Veglis and Bratsas (2017, P.226) stated that "Data journalism initially appeared in Greece in the form of simple infographics that informed the audience about certain parameters of news stories". Likewise, around 55% of data journalism content in Chinese news outlets were presented in the form of infographics (Zhang and Feng 2018). The issues surrounding data journalism terminology has imposed difficulty for scholars in pinpointing its emergence or what from or shape it take, since there are several terms associated with it, such as CAR, CJ, and news infographics.

3.7.1. Data journalism challenges in the GCC

Data journalism practises globally have faced challenges that restrict its ability to perform its desired role in society. In the prior section, I discussed the challenges that data journalism faces based on the scholarship of several academics, mostly studying data journalism in the Western context. It is important to note that there are some common challenges for data journalism between the West and the rest. However, non-Western journalists have experienced these challenges in a different manner, for example, this may be due to the lack of policies in non-Western nations that grant the access to data, such as Freedom of Information Acts that are found in Western countries.

The open data movement in the GCC started in the in the decade beginning in 2010, where the GCC's governments recognised the importance of open data as well as accepting it was a crucial aspect of the e-government programs. The GCC's governments viewed the implementation of open government data (OGD) as a way of attracting foreign investment and potentially leading to a great economic return (Elbadawi 2012). Furthermore, open data enabled accurate and relevant data to be published helping improve government transparency, which was the backbone of new reform initiatives such as Vision 2030 of Saudi Arabia and Vision 2040 of Oman. Another illustration of this is evident by the fact that open data portals are now available in these countries, including several datasets such as health, housing, and trade. Furthermore, the increase of freedom of press and information in the GCC was seen as reputation building and helped to establish a new source of legitimacy following the unrest caused by the Arab Spring ((Reinisch 2010; Davidson 2009).

Despite these changes, open government data still in its rudimentary stages, and a lot of work needs to be done to enhance the user experience in accessing and obtaining the data from governmental portals (Saxena 2017). Elbadawi (2012) recommended that in order for the GCC countries to fully implement OGD, they need to address several issues such as the legislation void in the GCC constitutions, he stated “Depending on the local context of each country, certain laws and legislations that deal with issues related to OGD (e.g., the citizens right to know) might be missing or in need for update and review. This exercise should be tackled to provide the OGD initiatives with the required legislation umbrella.” Also, he encouraged the GCC’s governments to adapt OGD international practices, and to develop a notional strategy and framework for OGD.

In terms of the existing data portals in the GCC, they currently have numerous issues that prevent them from becoming user-friendly platforms. These issues include out of date data, data not being machine-readable, data missing some elements and unavailable archival data (Saxena 2017).

The access to data is considered one of the main challenges that data journalism faces across the globe, GCC countries are no different in terms of data accessibility. In the loyalist media system, governments impose control via regulations to restrict access to data (Sakr 2007). Likewise, in these countries’ journalists have limited access to data in order to uphold the stability of the regime, since some data could put government and its officials in jeopardy (Bebawi 2016). Data journalists in the GCC struggle to overcome these restrictions since there are no laws that force the government to release its data. The only exception in the Middle East is Jordan, where there is a law regarding granting access to information (Yong 2014). Despite having a law granting access to information, the Jordanian government usually denies journalists' requests to obtain information on the basis of the data being classified as "security information" and could lead to danger when published (Bebawi 2020). 16 Arab data journalists identified the lack of public data as one of the main barriers that they face, even if the data exists, it is neither complete nor reliable. These 16 journalists also argued that Arab governments consider data as proprietary, and therefore they tend to reject any request to obtain it (Lewis and Nashmi 2019). Moreover, even if some data is available, it still not fully accessible since it is presented in a format that requires special skills to convert into spreadsheets or the most common format which is PDF (Fahmy and Attia 2020). To try and combat this issue, the UAE has launched a data portal in order to become more appealing to foreign investors, this portal offers data in different formats, such as Excel spreadsheets and is periodically updated. Another issue with accessing data is that although there may be some data available, it may be missing some critical details such as government spending and reported crime or the fact that some datasets are old, potentially causing it to lose it value via aggregation (Lewis 2020).

On other hand, there are some hopeful signs in regard to the availability of data, for instance, Vision 2030 of Saudi Arabia and Vision 2040 of Oman (https://vision2030.gov.sa/en; https://www.2040.om/en/) has promoted government transparency through the publication of accurate and relevant data about the performance of governmental agencies. As a result of the attempted to become more transparent, both Saudi Arabia and Oman have launched websites for open data (www.data.gov.sa and www.data.gov.om); these data portals contain several datasets that include sectors such as health, hosing and trade to name a few. Alongside this, Arab governments have finally began recognising the important of making accessible its data and there were even attempts to issue laws regarding the freedom of information, for instance, the Egyptian government drafted the FOI law in 2017, however it has yet to become an official law (El-Sayed 2017; Fahmy and Attia 2020).

The freedom of press and censorship is another boundary that restricts journalistic practices in the GCC (Al Yasin 2014; Duffy 2014). This issue is not only a problem for data journalism practices, but also extends to all forms of media in the GCC countries. Governments is the region remain in control over the media, despite the media entities having different types of ownership. The restricted freedom of the press in the GCC countries may obstruct journalists from reporting any wrongdoing or issues in their society, meaning they serve as a mobilisation tool instead of performing their actual role of encouraging people in power to be transparent and holding them accountable for their actions (Sakr 2003). Finally, journalists in the Arab world have to work with certain political and social expectations, and they have to maintain a balance between their role as journalists whilst respecting religion and cultural values (Lewis and Nashmi 2019).

The lack of interest in data among GCC's journalists is likewise a problem when it comes to data journalisms in the region. Mutsvairo (2020, P.11) described this issue as a common challenge in data journalism in the Global South and in the West. He attributed it to the lack of knowledge about data journalism, he stated "There's a potentially bigger problem, too: people, professional journalists included, still don't know what data journalism is and why they should be interested". This point is echoed in Lewis and Nashmi's (2019) findings when they interviewed 16 Arab data journalists, discovering ignorance was one of the main reasons behind the resistance of data journalism. Lewis and Nashmi (2019) also found that even if some journalists in Arab newsrooms were data literate and confident when working with software, and had access to computers, they didn't necessarily have the ability to collect and analyse the data by themselves. While the resistance of data journalism is linked to skills, journalists who lack data skills may prefer traditional journalistic skills, such as interviews (Lewis and Nashmi 2019). Furthermore, data journalism requires continuous self-development because it encompasses skills in multiple disciplines, such as design and coding (Fahmy and Attia 2020).

The lack of qualified staff, who have the ability to work with data, is one of the main challenges facing data journalism in the GCC. Scholars have attributed this problem to the lack of training courses and the absence of data journalism from curriculums in media schools in the region (Lewis and Nashmi 2019; Fahmy and Attia 2020). Despite the effort of private Arab media organisations to train journalists to be able to work with data, data journalists are still rare in the region (Lewis and Nashmi 2019).

Despite having the proper information and communication technology (ICT) infrastructure in the GCC countries, there is still a lack of the staff having the proper mindset that is required to understand the importance of and the dynamic nature of big data (Allagui and Ayish 2017). The absence of a quantitative mindset in the GCC, especially in the media industry, may hinder the complete implementation of data journalism in the region. However, this issue in not unique to the GCC, for example quantitative-oriented reporting in China is still in its early stages and the industry has not benefited from the development of CAR and precision journalism like their counterparts in the West (Zhang and Feng 2018).

There are also some challenges regarding the structure of the newsroom itself; for instance, there are no designated departments for producing data journalism content. Bekhit (2009) attributed the lack of infographics produced by Emirati newspapers to the absence of specialised departments and teams assigned to produce it. Furthermore, there is no clear policy regarding the production of such content, meaning journalists are unable to maximise the utilisation of data in their stories as they remain unsure about its usage policy (Bekhit, 2009).

3.8. Conclusion

In order to understand data journalism practices in the GCC context, it was imperative to take wider look into the media systems in these countries; this enabled me to grasp how certain aspects, such as the political and cultural aspects were impacting the news making process in the region. That was done by reviewing the historical context of the media system theories and its developments, and how the GCC context fitted within them. Not only were the media system theories important for this research, but equally as important was the development of media and journalism in the GCC, which shed light on the factors and conditions that had helped shape the media industry in the region. One factor, namely, governmental involvement in terms of financial support or decision making appeared to be dominant. Therefore, news organisations in the region tend to be loyal to the ruling regime and always strive to be in the government's good books.

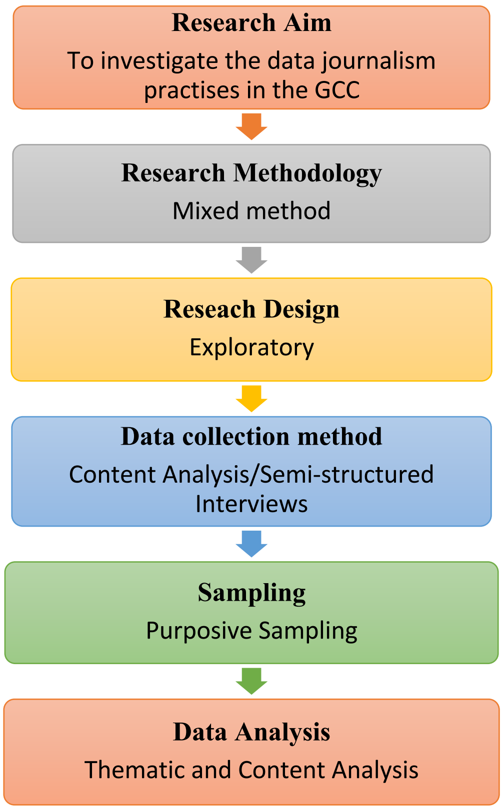
For this reason, I chose the framework hierarchy of influence in order to evaluate several layers of influence in the content of journalism in the GCC. This enabled me to identify other factors that affect data journalism practices in the GCC, such as political, economic, organisational and professional issues. Moreover, these influence factors allowed me to develop the second phase of my research and aided my understanding of the dynamic of news industry in the region and the conditions that affect it.

To study data journalism in its current form, it is crucial to look back to its development and the conditions that shaped it. Similarly, it is important to distinguish it from other practices, such as CAR, news infographic and CJ, while highlighting the analytical difficulties surrounding data journalism terminology, and how it may affect its practice and adoption. Furthermore, this chapter reviewed data journalism application in the newsrooms, while providing an insight about its forms, approaches and method of integration. This review aimed to understand how data journalism practices in the Western context differ from the from the GCC context, while emphasising the legacy of journalistic practices, such as investigative reporting on the adaption of data journalism in the newsrooms.

Finally, this chapter discussed data journalism in the context of the GCC, describing the analytical difficulties in analysing data journalism outside the Western context. These difficulties appeared from the attempts of de-westernising data journalism, which is a problematic task, since the whole concept of data journalism was founded on Western values, such as the freedom of press and freedom of information. However, the examination of data journalism practises in the GCC could potentially overcome this issue, since it will shed light on how data journalism are practised in part of the world that lack these values.

4. Methodology

This chapter will highlight the methods that have been used in order to answer the research questions. It starts with the research aims and objectives, addressing how each research question will be answered in order to achieve the research objectives. It will discuss the research methods (mixed methods) and the rationale of its use, while addressing its advantages and disadvantages. Next, it will shed light on the research design (exploratory), and my justification for using this approach, once the research design has been justified, I will highlight its abilities and limits. Following this, I will outline in detail the data collection method that has been utilised to collect the research data, providing a justification for selecting these data collection methods. Finally, this chapter will explain the sampling and data analysis process, detailing the steps that I took to minimise the effect of any biases.



4.1. Research aims, objectives and questions.

4.1.1. Research Aims

Based on the context the literature review, the aim of this study is to investigate data journalism practises in the GCC's member states, focusing on the boundaries and challenges that data journalism faces in the newsrooms of these countries. Additionally, this study aims to explore how data journalism is viewed, understood and operationalised within newsrooms in the aforementioned countries, while concentrating on the other aspects that may affect data journalism practises, such as the political context. Lastly, this research aims to identify how data journalism is being practised in newsrooms in these GCC countries, highlighting any data journalism taxonomies or workflows that exist in the region.

4.1.2. Research Objectives

- Critically review literature to identify how media system have developed, in order to understand the difference between the Western and non-Western systems. In addition, to examine the history and development of media in the context of four GCC member states (Saudi Arabia, United Arab Emiratis, Oman, and Bahrain) and the factors that impact journalism practices in the region.
- Identifying the history of data journalism and how it has evolved through the years, while highlighting the challenges that faces this type of journalism.
- To investigate the current situation of data journalism in the Gulf region. This research will evaluate the content of several news outlets in the area to identify how data journalism is being practised.
- To highlight the challenges facing data journalism in four of the GCC member states and how the newsrooms deal with them.

- To provide and in-depth insight on how journalists in the Gulf understand data journalism and how data journalism has been operationalised in their newsrooms.
- Identifying any existing data journalism's taxonomies and workflows in four of the GCC member states.

4.1.3. Research Questions

1) What are the characterises of data journalism contents in the Gulf Cooperation Council (GCC) states of Saudi Arabia, United Arab Emiratis, Oman, and Bahrain?
2) What are the forms and practices of data journalism in these GCC states?
3) How is data journalism viewed, understood, and operationalised within GCC newsrooms?

These inquiries will be addressed using a mixed-methods approach; this is depicted in the table blew.

Table 2. How to answer research questions.

Research questions	Method used to address it
What are the characterises of data journalism contents in the Gulf Cooperation Council (GCC) states of Saudi Arabia, United Arab Emiratis, Oman, and Bahrain?	Quantitative approach
What are the forms and practices of data journalism in these GCC states?	Qualitative approach

How is data journalism viewed, understood, and operationalised within GCC newsrooms?	Qualitative approach

4.2. Research Methodology

Research methodology refers to "The strategy, plan of action, processor design lying behind the choice and use of particular methods and linking the choice and use of methods to the desired outcomes" (Crotty 1998, P.3). Scholars have argued that selecting the appropriate methodology is based on the aims, questions, and information of the research; these all help determine the most appropriate way to obtain the data and answer the research questions (LeCompte et al 1993). According to Matthews and Ross (2010) there is an interlink between the research questions and the selection of the research approach or methodology (quantitative, qualitative, and mixed method).

4.2.1. Quantitative

The quantitative approach is usually linked to numerical data where researchers use quantitative tools to collect data, such as surveys. Once the data is collected, the analysis procedure usually involves dealing with statistics and quantities (Creswell 2012; O'Leary 2013: Saunder et al. 2016). This approach aims to examine the relation between variables, such as patterns and similarities and differences (Saunder et al. 2016).

4.2.2. Qualitative

The qualitative approach is typically linked to non-numerical data and deploys techniques such as interview and focus groups, in order to examine behaviour, attitudes and experiences (Dawson 2013). It uses a categorisation method such as thematic analysis to analyse the data. It aims to investigate the social relations and explain reality as described by the research participants (Saunder et al. 2016).

4.2.3. Mixed Method

Mixed method refers to the use of both quantitative and qualitative methods to collect numerical and text data and then analyse the collected data using quantitative and qualitative procedures such as statistics and categorisation. Researchers can apply a mixed method approach in order to gain a clear understanding of research concepts and exploration (Creswell, 2012; Creswell and Clark, 2011; Saunders et al. 2016). The mixed methods approach also enables researchers to generate new knowledge (Stange et al. 2006).

The use of this approach has advantages as well as disadvantages. Creswell & Clark, (2011) listed the advantages in utilising the mixed methods approach as the following:

1. It significantly reduces any research weakness while combining the strengths of both the quantitative and qualitative approaches.
2. It helps the researcher by allowing him/her to obtain more evidence regarding the research problem.
3. It allows the researcher to explore and find answers for research questions that are not discoverable by using a single approach.

Despite these benefits, the mixed method approach also has disadvantages. According to Creswell & Clark (2011), these disadvantages include:

1. The researcher needs to be capable of working with both quantitative and qualitative approaches. He/she also needs to have a good understanding in terms of data collection and analysis techniques of both approaches.

2. The researcher needs to manage time effectively, since applying both approaches is a time-consuming process.
3. The mixed method approach requires having sufficient logistic and financial resources, such as software and research expenses.

Based on the aforementioned advantages and disadvantages, a fully integrated mixed methods approach was utilised to answer the research questions. The fully integrated mixed methods approach, according to Saunders et al. (2016) refers to the mix of the quantitative and qualitative approach at every stage of the research. These stages include design, data collection and analysis, interpretation, and the presentation of the research.

The mixed method design includes two approaches; a single-phase design, which involves using one phase of data collection and analysis. A multi-phase design which uses more than one phase of data collection and analysis and allows the researcher to expand and elaborate on the initial sets of findings (Saunders et al. 2016). This research will use a multi-phase mixed method (quantitative followed by qualitative) in order to achieve the research objectives. Saunders et al. (2016) stated that:

> "Using a double-phase or multi-phase research design suggests a dynamic approach to the research process which recognises that mixed methods research is both interactive and iterative, where one phase subsequently informs and directs the next phase of data collection and analysis" (Saunders et al. 2016, P.171).

Researcher choose to adopt the mixed-methods approach for several reasons. According to Saunders et al. (2016) there are 10 primary reasons for using a mixed methods design, such as initiation, facilitation, diversity and focus to name few. This study adopted the mixed methods approach for the reasons known as initiation, which is described by Saunders et al. (2016) as

> "Initial use of a qualitative or quantitative methodology may be used to define the nature and scope of sequential quantitative or qualitative research. May also be used to provide contextual background and to better understand the research problem. May also help in the formulation or redrafting of research questions, interview questions and questionnaire items and the selection of samples, cases and participants" (Saunders et al. 2016, P.173).

Greene et al. (1989) refer to this justification in using mixed methods as the development, which they described as using the result from one method in order to develop and inform the other method. Based on this, this study adopted the mixed methods approach for several reasons: a) the current situation of data journalism content in the GCC was relativity unknown to me. This includes the type of visualisation, source of information, procurement, and subjects of data journalism content. Therefore, using the quantitative approach to analyse data journalism content in the several GCC news outlets enabled me to answer RQ1 and gain contextual background into data journalism content in the region. b) The use of the mixed methods approach (quantitative followed by qualitative) allowed me to identify some patterns in the data journalism content in the GCC, which in turn allowed him to better form the interview questions for the second phase of the study. For instance, I noticed a dominance of soft news content in data journalism stories in the GCC news outlets, also the quantitative content analysis showed a heavy reliance on websites as a source of information for data journalism stories. This was something I bore in mind when formalising his interviews questions. This benefit was also mentioned by Matthews and Ross (2010) who argued that the quantitative approach followed by the qualitative approach allows the researcher to explore in depth some of the issues that were raised in the quantitative data.

4.3. Research Design

Scholars refer to research design as the logical and consistent stages conducted in order to bring together the research questions, data collection and data analysis in a rational way (O'Gorman and MacIntosh 2015). The research design process has three levels of decision-making: 1) identifying the appropriate research methodology (quantitative, qualitative or both) which in turn will enable the researcher to select the required evidence to conduct the research. 2) identifying the research strategy and 3) selecting the type of research method that will be used to collect and analyse the data (Brewerton and Millward 2014). In the previous section, I identified the mixed-methods approach as the research methodology that will used in this study. This piece of research will use an exploratory design in order to achieve the research aims and objectives set out above. The selection of this research design was due to several reasons. Firstly, exploratory design is usually used when very little is known about the topic of the research (Strauss and Corbin 1998). Robson (2002) argued that the exploratory approach aims to find out "What is happening; to seek new insights; to ask questions and to assess phenomena in a new light" (Robson 2002, P.59). In a similar vein, Saunders et al. (2016, P.174) described the exploratory approach as a "Valuable means to ask open questions to discover what is happening and gain insights about a topic of interest". Mariampolski (2001) argued that the exploratory approach is used when a researcher aims to expand the current state of knowledge in the chosen field of study.

Secondly, the process of conducting exploratory research involves three major steps: reviewing the existing literature, interviewing experts in the subject, and conducting in-depth individual interviews (Saunders et al. 2016). I reviewed the existing literature on media systems and its effect on the media landscape in the GCC, he also investigated the development of media and journalism in the GCC. Likewise, I highlighted the factors that impact media production in the region by utilising the hierarchy of influence framework. In addition to this, he examined the history and development of data journalism in the global context, while emphasising on its use in newsrooms and the factors that have played a part in its integration and popularity. I also identified the challenges that data journalism practises face globally and in the GCC, and the existence of data journalism beyond the Western context.

Once this was done, I conducted semi-structured interviews with data journalism experts, which was a part of phase two of this study. During this part, I interviewed several journalists, analyst and designers who work on data journalism production in their respective newspapers. To add to this, I interviewed other staff who work on the newspapers, but have an indirect connection to data journalism production, such as senior level editors, other journalists, and designers.

The final reason for selecting the exploratory design for this research is the flexibility and adaptability to change that this approach allows (Saunders et al. 2016). Saunders et al. (2016, P.175) advised researchers using the exploratory approach to be flexible and adaptable, they stated "If you are conducting exploratory research you must be willing to change your direction as a result of new data that appear and new insights that occur to you". The flexibility and adaptability of the exploratory approach allowed me to change the direction of this study after the new data had emerged. For instance, the initial aim of the study was focusing only on the challenges that data journalism production faced in the GCC. However, after conducting the second phase of the research, it occurred to me that there were different taxonomies and workflows of data journalism production in the examined newsrooms. Therefore, I slightly changed the direction of the research to include these findings in the research aim.

Due to the aforementioned reasons, the exploratory approach is a suitable approach to use in order to study data journalism practices in the GCC. This is primarily because there is little known about data journalism in the GCC. This is illustrated by the fact that only two articles have been published discussing data journalism in the Arab world (Lewis and Nashmi 2019; Fahmy and Attia 2020), and only two books that have been published contain a chapter related to data journalism in the Arab world. (Bebawi 2020; Lewis 2020). To add to this, the exploratory approach enables me to overcome the vagueness surrounding data journalism; something that has been highlighted in the previous chapter. The process of this approach allows me to examine the social phenomena from different standpoints, such as reviewing the existence literature and interviewing experts in the subject. Finally, its flexible and adaptable nature allows me to adjust the direction of the study when new evidence come to light.

4.4. Data Collection Methods

This piece of research is considered multiphases because of the use of two different approaches to collect and analyse the data. The first phase of this research is a quantitative content analysis, while the second phase is a qualitative approach using semi-structured interviews to collect the data.

4.4.1. Content Analysis

Content analysis is defined as “A research method for the objective, systematic and quantitative description of the manifest content of communication” (Berelson 1952, P.26). This method aims to lend insight into a given phenomenon (Shoemaker and Reese 2014), obtained by counting the frequency of ‘themes, values, images or words’ in the relevant context (Gillespie and Toynbee 2006, P.5).

Content analysis was first utilised by Harold Lasswell in 1927 in an attempt to study propaganda, and by the 1920s and 1930s this method had gained greater popularity in studying the content of motion pictures (Macnamara 2005). By the 1950s, content analysis had become the primary method of investigating the portrayal of violence, racism and women in television and films (Macnamara 2005).

In the first phase of this study, I aimed to outline the current of data journalism in the GCC, and for this purpose, quantitative content analysis was deemed the most suitable method of investigating the content of data journalism. There are several reasons behind this choice. Firstly, the versatility and flexibility of this method enables the researcher to adapt the research model when quantifying and measuring the collected data (Riffe et al. 2005). Secondly, the proper execution of the method, especially in the coding and category design stages, is expected to boost the credibility of the study's findings (Matthews and Ross 2010). Finally, the popularity of this approach when study emerging forms of media, for example, online news (Sjøvaag et al. 2012) and Twitter feeds (Hermida et al. 2014) has been increasing. This is evident from the fact that numerous studies in this field have applied this approach when examining the content of data journalism. For instance, Knight (2015) applied content analysis when studying the content of data journalism in the UK and investigating the use of data journalism in several UK national daily and Sunday newspapers. Knight discussed several elements of data journalism in her paper, such as subject that were covered by data-driven stories, the types of data visualisation and the sources of information (Knight 2015).

Like any other method, quantitative content analysis still encounters some challenges in the form of limitations and disadvantages that may impact its proper application. One of the main challenges in applying this approach is the inaccurate representation of the sample, which may undermine the study's findings (Berger 2018). In addition, the inaccurate coding and selection of categories can negatively impact the validity and reliability of the study (Matthews and Ross 2010). In this context, Krippendorff (2004) highlighted three fundamental types of reliability that researchers need to consider when conducting content analysis: namely, 'stability', 'reproducibility' and 'accuracy' (Krippendorff 2004, P.214). The first of these, that is, stability, refers to the consistency of the procedures used to analyse the data, which is important in ensuring valid inferences of the collected data (Weber 1990). Reproducibility implies that a different coder will arrive at the same result upon using the same method to analyse the data (Gillespie and Toynbee 2006). Finally, accuracy refers to the coder's ability to sustain the standard of other similar studies (Krippendorff 2004). A further challenge is that content analysis is unable to indicate the causes and effects of various phenomena since it works as a descriptive technique rather than an interpretive technique (Bryman 2012).

However, this content analysis aims not only to profile the present status of data journalism in the Gulf Cooperation Council (GCC) states, but to also help me formulate and enhance his interview questions. The content analysis will allow me to gain a deeper insight into the production of data journalism in the study sample, thus helping to identify regional themes and patterns.

4.4.1.1 Sampling

This study aims to examine data journalism practises in the six Gulf Cooperation Council (GCC) states. To examine these practises, I will investigate the contemporary situation of digital data journalism content in these countries. This examination will enable me to answer the first research question, focusing on how data journalism has been used in GCC's publications. For this study, I identified the following timeframe: from the 1st of September to the 31st of December 2016. This timeframe included the most recent months of content when the research was in progress, providing me with a more up-to-date insight into digital data journalism content in the GCC. I then undertook a data collection process that focused on the GCC's news outlet websites rather than print editions. The digital versions of these newspapers provided numerous advantages. Clearly, the digital version is more accessible than the printed edition. More importantly, the digital content enabled me to determine more accurately the visual aspects of data visualisations, digital stories include more interactive and moving elements in data visualisation.

I also utilised a relevance/purposive sampling technique to select the content analysis sample because this study seeks to analyse data journalism content produced in the designated timeframe. Krippendorf (2004) argued that this technique relies on significant reading and analysis of the sampled text, in order to identify the content that is relevant to the research. He stated that relevance sampling "Aims at selecting all textual units that contribute to answering given research questions. Because the resulting sample is defined by the analytical problem at hand" (Krippendorf 2004, P.119).

Therefore, I reviewed all the daily Arabic/English newspaper's websites that published in the GCC countries. This resulted on reviewing 9 websites for newspapers in the UAE, 15 websites in Saudi Arabia, 8 websites in Bahrain, 8 websites in Oman, 7 in Qatar, 9 in Kuwait. This review resulted in selecting the following publications to form the sample of the study:

Table 3. The sample of the study (content)

Name	Country	Type of publication	Type of Ownership	Language	Number of articles
Makkah	KSA	Daily newspaper	Private	Arabic	222
Alwasat	Bahrain	Daily newspaper	Private	Arabic	324
Shabiba	Oman	Daily newspaper	Private	Arabic	3
Gulf news	UAE	Daily newspaper	Private	English	10

It is worth noting that Alwasat and the Shshabiba were the only publications in their respective countries to publish data journalism content in the chosen period. Meanwhile, Gulf News was the only English newspaper in the region to run this type of content, and it in fact has a section of its website devoted to data visualisation. Makkah was selected because of its reputation as one of the pioneering Saudi newspapers producing this kind of content. This publication has been received many accolades for its data journalism stories, including its recent story regarding Saudi Arabia's spokespeople (Arab News 2017). The story was about how responsive the country's official spokespeople were, and how they interacted with journalists' inquiries. Makkah has a specific section on its website for this type of content, and recently, the newspaper launched a verified Twitter account as a part of its new "the fun of knowledge" initiative, which focuses on data journalism content.

The procedure for data collection involved searching for a section devoted to data journalism content on the newspapers' website. This search utilised key words associated with such content, such as infographic, data, and map, in both Arabic and English.

Even though four out of the five newspapers are privately owned, the governments in these countries still exercise control over the "the loyalist press" (Rugh 2004). This governmental control involves imposing restrictive policies and supporting newspapers financially (Awad 2010). For example, the late King Abdullah of Saudi Arabia paid around $3 million to help the old version of the Makkah newspaper during its economic crisis in 2006 (Aleqtisadiah 2006). The sample excludes two GCC countries: Kuwait and Qatar. Kuwait was omitted because chosen news outlets in the country did not contain any data journalism content during the chosen timeframe, while Qatari news outlets were not included due to a diplomatic crisis that emerged during the research.

4.4.1.2 Coding

This study will utilise existing codebooks from previous studies into this area of journalism. Sjovaag and Stavelin (2012) advised scholars to depend on existing codebooks when developing the coding scheme for their studies, particularly when using a quantitative content approach to analyse news content. This reliance on existing codebooks ensures that the coding process has been validated by other scholars, thus enhancing, and improving upon the research findings. Consequently, this study will draw on several studies into data journalism and data visualisation in order to develop its codebook for the content analysis. These studies include Knight's (2015) study about data journalism forms and content in the UK, Weber and Rall's (2012) research into data visualisation and visual storytelling, Siricharoen and Siricharoen's (2015) study evaluating infographics, and Loosena et al. (2015) content analysis of data journalism pieces. The coding process includes several steps in developing a comprehensive coding schema, a schema that will enable me to ensure the quality of the study's findings. These steps involved the following: reviewing the existing codebooks from previous studies, inspecting the way that previous studies developed and used these coding schemas, conducting an initial examination of the sample and making notes regarding the data journalism content. In the end, I developed a coding book by integrating existing codebooks with his notes.

Table 4. The development of the codebook

Unit of Analysis	**Previous studies**	Codes adopted	Codes adapted
Subject of the story	Knight (2015)	Entertainment, lifestyle, world, social issues, science, health, and politics	Sport, financial, religion, and other

Data visualisation	Knight (2015) Weber and Rall (2012) Siricharoen and Siricharoen (2015)	Map, graph, chart, combination infographic, list, number pull quote, table, textual analysis, timeline, plans, the compare & contrast “vs: versus”, how-to “process oriented”, “did-you-know?”	
Graphic text relationship	Weber and Rall (2012)	Text, images, video	Text and data visualisation; text, images, and data visualisation; text, videos and data visualisation; text, images, video and data visualisation; and stand-alone data visualisation
Sources of information	Knight (2015) Loosena, Reimera and Schmidt (2015)	Government, corporate entities, research institutes, Non-profit groups, Pan-national organisations, Polls and self-generated, source not indicated	News agencies, websites, and other

4.4.1.3 Units of analysis

Through the literature review, this study uncovered several aspects of data journalism content that must be considered when answering the research questions. Therefore, the first unit of analysis is the type of the stories, which focuses on how the stories have been published. This characteristic of data journalism content has not been mentioned in any previous coding schema, leading to an inductive coding strategy. I conducted an initial analysis in order to determine the types of stories and to identify the medium of publication (digital or print). The initial analysis showed that the following types of stories utilised a form of data journalism: news reports, feature articles, videos, photo galleries, web documentaries, data visualisation articles.

The second unit of analysis is the subject of the story, which concentrates on the topic of the story. Knight's (2015) study of data journalism in the UK indicated the following primary subjects were covered by data journalism stories: entertainment, lifestyle, world, social issues, science, health, and politics. However, the initial analysis of the data revealed new subjects that needed to be accounted for when analysing the content of data journalism stories in the GCC. Therefore, other subjects have been added, these include sports, finances, religion, to name a few.

The third unit of analysis is the data visualisation used in data journalism stories. This level of analysis focuses on the visualisation elements that have been used in data journalism stories. The preliminary coding scheme for data visualisation was based on the work of Knight (2015), as well as Weber and Rall (2012). This scheme included the following: maps, graphs, charts, various combinations, infographics, lists, number pull quotes, tables, textual analyses, timelines and plans. However, after reviewing the data, further coding was needed, especially for the infographics. Therefore, the infographic, as a type of data visualisation, has been divided into four different subcategories based on the work of Siricharoen and Siricharoen (2015): the combination infographic, the compare and contrast "vs: versus" (see appendix 7.2), how-to "process-oriented" (see appendix 7.1) and "did-you-know?" (see appendix 7.3) (Siricharoen and Siricharoen 2015).

The fourth unit of analysis is the graphic text relationship. At this level, I analyse the existence of any graphic text relationship in the data journalism content. This coding scheme was developed based on Weber and Rall's work (2012). The subcategories of the graphic text relationship include the following: text and data visualisation: text, images, and data visualisation: text, videos and data visualisation: text, images, video and data visualisation: and stand-alone data visualisation.

The fifth unit of analysis focuses on the sources of information used in data journalism stories. This analysis aims to identify the sources of data for the news outlets. Knight's taxonomy (2015) describes six sources of information: governments, corporate entities, research institutes, non-profit groups, pan-national organisations, polls, and self-generated information. However, after an initial review of the data, several subcategories emerged as necessary in the coding book: source not indicated (Loosena et al. 2015), news agencies, websites as well as others. In this unit of analysis, the criterion of news agencies refers to the global news agencies and wire services, such as Reuters and Associated Press. These sources tend to be places from which newspapers obtain their information for data journalism stories. On other hand, the websites criterion refers to non-news related websites and blogs from which information was obtained on lifestyle, health, and educational topics.

The last unit of analysis concentrates on sources of production for data journalism stories. This level of analysis considers the location where the data journalism piece was produced. As no existing codebook has discussed the source of production for data journalism stories, this unit of analysis had to be coded inductively. The coding for this unit of analysis represents an adjustment of the previous unit of analysis, the source of information. There is a slight difference in terms of the self-generation of data and internal production. The subcategories for sources of production include internal production, governments, corporate entities, research institutes, non-profit groups, pan-national organisations, news agencies, source not indicated as well as others.

4.4.2. Semi-Structured Interviews

Phase two of this research will involve conducting semi-structured interviews with data journalism teams/journalists in several newsrooms in the GCC. The content of these interviews will be added to my notes regarding the content analysis of data journalism in the GCC, as well as the literature review informing this study.

Scholars consider interviews as a direct and effective way to get in depth knowledge about real-life phenomenon (Creswell 2014; Dickinson 2008). Conducting interviews allowed me to unearth information that helps to explain the social phenomenon, which in turn allow me to compare interviewees answers (Patton 2009; Saunders et al. 2016). The ability to use both open-ended and close-ended is one of the main features of semi-structured interviews, which in turn enable researcher to create themes and categorise the data. In order to obtain the necessary information that required to answers the research questions and accomplish the research objectives (Saunders et al. 2016). The descriptive nature of semi-structured interviews allows the interviewees to provide their perspectives about social phenomenon, which enhance a detailed exploration of the topic (Charmaz 2006).

I elected to conduct semi-structured interviews for several important reasons. First, this structure allows one to capture in-depth information about the proposed topic. Second, scholars consider it to be the most suitable tool for collecting data when it comes to evaluative and expletory research (Matthews and Ross 2010). Third, the research interviews are developed through several aspects such as the research questions and objectives, also it may be developed following a framework utilised by me. The ability of developing the structure and purpose of the interviews allow me to have control over the direction of the interview, also it allows me to gain rich data since he has the ability to seek explanation and expansion of the interviewee's answerers (Kvale and Brinkmann 2009). In a similar vein, semi-structured interviews allow the researcher to ask follow-up questions, which enable researcher to probe the information provided by the interviewee also it allows the researcher to clarify his ideas of questions to the interviewee (Saunders et al. 2016). Lastly, semi-structured interviews allow the interviewees to provide important background and contextual material that relevant to the topic of the study, which is a valuable essential part for exploratory research (Saunders et al. 2016).

4.4.2.1 Sampling

As O'Gorman and MacIntosh (2014) argued that research design is an imperative part to logically organise the research steps that include research questions, data collection and data analysis, since this research adapted the exploratory design in order to answer research questions and achieve its objectives. Interviewing experts or people who has connection with the social phenomenon is consider as one of the main elements that exploratory approach utilises to fulfil its aims (Saunders et al. 2016). Therefore, I utilised purposive sampling technique to select the interviewees who participate in this research. Since selecting the interviewees randomly may not ensure that they have the required knowledge to provide useful information for the problem at hand Kvale and Brinkmann 2009).

The purposive sampling technique consider as a non-probable (non-random) approach, since the participants are selected for specific reason (Denscombe 2010). These reasons include their knowledge and experience of the research topic, which in turn will dictate their ability to contribute to for the problem at hand (Saunders et al. 2016). Also, they may have certain features that allow them to enrich the research data, that include their positions in company (Denscombe 2010). These features come handy especially when studying people based on their role in the organisation rather than asking them about their personal views (Brewerton and Millward 2014), which is the case of this research where I aim to investigate data journalism practises in the GCC newsrooms. Therefore, this conscious choice reflects the fact that purposive sampling enables the researcher to select participants with a direct relationship to the topic in question, thus greatly improving the relevance and quality of data (Matthews and Ross 2010).

Consequently, I selected the research's participants based on their role in the newsrooms, he identifies four roles that has direct/ indirect involvement on data journalism content which include senior level editors that oversee the news making process in either newsroom level or department level, usually they have control over what stories should/should not be publish. Journalists and designers are the other roles I identified, where they sometimes have either direct or indirect contention to data journalism content. The last role is the newsroom's personal who work with data directly that include data journalist, data analyst and content creator.

The aim of the research was to analyse the newsrooms of the news publication that were in the phase one of the research. However, several issues have hindered the continuity of the seam sample, first, in June 2017 Saudi Arabia and other Arab countries that include UAE and Bahrein cut their diplomatic relation with Qatar, which in turn make it impossible for the Saudi-founded researcher to conduct interviews with personals from AJE. Therefore, I eliminated AJE from his samples, due to the difficulties impose by the current diplomatic crisis. Second, AJE were the second English news publication in the sample beside the Gulf news, after eliminating AJE the Gulf news was the solo English news outlet in the sample. Therefore, I and my supervisory team agreed to eliminate the Gulf news from phase two, since it will become an outlier compared to other news outlets. Third, when I was organising the interviews with newspapers, he has learnt that Alwasat newspaper in Bahrein was suspended by the Bahraini government until further notice, I knew that just days before he undertook the field work of this research. So, in coordination with the supervisory team I replaced Al Wasat newspaper with Alwatan newspaper. The phase two sample became as the following table.

Table 5. The sample of the study (interview)

Name	Country	Type of publication	Type of Ownership	Language	Number of participants
Makkah	KSA	Daily newspaper	Private	Arabic	7
Alwatan	Bahrain	Daily newspaper	Private	Arabic	6
Shabiba	Oman	Daily newspaper	Private	Arabic	5
Alroeya	UAE	Daily newspaper	Private	Arabic	4

4.4.2.2 Interview Process

After deciding the newspapers that will form the sample of the second phase of this research, I contacted each newspaper in order to set up a date to conduct the interviews with the selected personnel of each newsroom. These personnel included senior level editors, journalists, designers and people who work with data (e.g., data journalist, data analyst and programmer). The communication with the newsrooms usually started with a phone call to introduce myself and give a brief overview of the research, this was followed by an email to state the number of interviewees and their role in the newsrooms. I indicated that the maximum number of participants was 10 people, and that each role should be represented by at least two people (e.g., two journalists, two designers and so on). Also, in the email I inquired about the best date and time that suited each newsroom to conduct the interviews. As the newsrooms were located in different countries, there was a need to pre-agree on a time and date so that travel arrangements can be made, allowing me to arrive in the country of the newsroom a day prior to the interviews.

All interviews were conducted in Arabic, lasting between 15 minutes to one hour and 45 minutes depending on the answers of the interviewee and their schedule. All interviews were conducted in the newsrooms of each newspaper, three newsrooms provided me with a private room to conduct the interviews, while in the other newsroom I conducted the interview at the interviewees' decks. I spent an average of 4-6 hours in each newsroom; this included the late afternoon which is seen as the busy hours of the news making process. All the interviews were recorded on two recorders in order to minimise the risk of any technical difficulties, and I obtained consent from each interviewee to be recorded. Before conducting the interview, I handed out the participant information sheet, which provided details of the study and the reasons for selecting them to participate. Next, I asked each interviewee to fill the participant agreement form, both forms were provided in two language English and Arabic and were part of the ethical requirements set out by Bournemouth University.

There were 22 participants in total from all selected newspapers, and their roles varied from senior level editors to journalists, designers and personnel working with data. The following table shows their role in the newsroom and their code and newspaper:

Table 6. Interviewees' codebook

Code	Role in the newsroom	Newspaper
SR1	Senior level editor	Makkah
SR2	Senior level editor	Shabiba
SR3	Senior level editor	Alwatan
J1	Journalist	Makkah
J2	Journalist	Makkah
J3	Journalist	Shabiba
J4	Journalist	Shabiba
J5	Journalist	Alwatan
J6	Journalist	Alroeya
D1	Designer	Makkah
D2	Designer	Makkah
D3	Designer	Shabiba
D4	Designer	Alwatan
D5	Designer	Alwatan
D6	Designer	Alwatan
D7	Designer	Alroeya

D8	Designer	Alroeya
DJ1	Data analyst	Makkah
DJ2	Content creator	Makkah
DJ3	Data journalist	Alwatan
DJ4	Designer/Data analyst	Shabiba
DJ5	Senior level editor/data journalist	Alroeya

The sample contained four senior level editors, including an editor-in-chief, two managing editors and one digital deck supervisor. There were six journalists from different departments, such as the political department and the local issues department. Eight designers took part in this phase, some of these designers were working on both the newspaper's layout and data visualisation, while the others were only working on data visualisation. There were five people who worked directly with data journalism content; DJ 1 and 2 only worked on data projects, while the other three worked on data projects in addition to other newsrooms tasks.

4.4.2.3 Challenges related to the interviews.

I encountered several challenges before and during the interviews, making the interview process a little difficult. The unforeseen suspension of Al Wasat newspaper in Bahrain forced me to rely on his personal contacts to find a newsroom to conduct the interview at such short notice. Also, one of the newsrooms was slightly unresponsive in the latter stages of the communication, although they had initially agreed to be a part of the study. They set up a date but failed to decide on a time until the day before the interview data. This was only after I have exhausted all the means of contacting them using phone, email, and their social media account.

At the eleventh hour they finally agreed to conduct the interviews on 18/04/2018 at 12pm. I arrived at the newsroom before the scheduled time, he waited in the waiting room for around one and half hours only to be told to return at 4pm since all the newsroom personnel were busy at the time.

Due to the fact that all interviews were conducted during the busy hours of the newsrooms, some challenges were presented to me such as the availability of some personnel. The timings also caused some disruption while conducting the interview, since some interviews were interrupted by other newsrooms workers who wanted to ask the interviewee about something related to their work.

4.4.2.4 Transcribing

Transcribing was an important part of the research and involved the researcher converting the data from an audio form into a text form. The transcribing process involved the researcher listening to the audios from the interviews several times, once this was done, the researcher transcribed it into text. This process was a time-consuming task lasting two months; however, it was one of the primary ways for the researcher to familiarise himself with the collected data.

4.4.2.5 Thematic Analysis

Analysing the data in the qualitative approach involved several steps, which were highlighted by Bogdan and Biien (1982). They stated that data analysis involves "Working with data, organizing it, breaking it into manageable units, synthesizing it, searching for patterns, discovering what is important and what is to be learned, and deciding what you will tell others" (Bogdan and Biien 1982, P.145). This research applied a thematic analysis approach in order to analyse its qualitative data, Grbich (2013) describe thematic analysis as "A process of segmentation, categorisation and relinking of aspects of the data prior to final interpretation" (Grbich 2013, P.16). The process of segmentation, categorisation and relinking enables the researcher to gain a better understanding of the participants' words, stories, accounts, and explanation. This in turn allows the researcher to the describe the data and explore its meanings and relationships (Matthews and Ross 2010). Scholars consider thematic analysis as a systemic, flexible, and accessible approach to analysing qualitative data, as it searches for themes within data in an orderly and logical way (Braun and Clarke 2006; Saunders et al. 2016). The process of thematic analysis is not solely based on the search of themes within data, but it also includes working with raw data in order to interpret key ideas (Matthews and Ross 2010). The thematic analysis involves several procedural steps that include familiarising yourself with the data (immersion in the data), coding the data, generating themes and categories and offering interpretations (Matthews and Ross 2010; Braun and Clarke 2013; Saunders et al. 2016)

The step of immersion in the data starts when the data is collected and organised, Braun and Clarke (2013) argued that the researcher may familiarise him/herself with the data by reading through the transcripts or filed notes many times and then they may be able to develop themes within the data. The intensive reading of the collected data enables the researcher to identify important information related to the task at hand (Marshall and Rossman 2011), which in turn allows the investigator to find recurring themes and patterns in the data (Saunders et al. 2016).

Coding the data aims to categorise data with similar meanings together by labelling them with a code that indicates its exact meaning (Saunders et al. 2016). "Coding is a process of identifying aspects of the data that relate to your research questions" (Braun and Clarke 2013, P.206). Coding the data not only allows the researcher to generate themes to answer research questions, but it also enables the researcher to comprehend the meanings of the collected data (Saunders et al. 2016). The researcher usually develops some initial codes while collecting and transcribing the data, an analytic tactic described by Miles and Huberman (1994) who argued that qualitative researchers usually develop codes during and after data collection.

The process of generating themes and categories started in the early stages of the research, hence some initial and general themes emerged from reviewing the literature (Patton 2009). For instance, one of the main challenges data journalism faces around the globe was the fact that the production of data journalism is considered a laborious, time-consuming process; this was highlighted by several researchers such as Fink and Anderson 2014 and Veglis and Bratsas 2017. Therefore, I identified time as one of his initial themes that impacts data journalism in the GCC; this has also been validated by the responses to the interview questions.

However, searching for themes, patterns and relationships while collecting and coding the data itself is considered as one of the primary ways of creating themes and categories. The theme is considered as a unit that incorporates several codes together that are related to each other, or it can be an indication of the importance of the code to the research question (Saunders et al. 2016). The development of themes is an important process in order to answer the research questions, since it allows me to interpret the data by providing meaning and coherence to the data (Marshall and Rossman, 2011). Marshall and Rossman (2011, P.162) further state:

"Attaching significance to what was found, making sense of the findings, offering explanations, drawing conclusions, extrapolating lessons, making inferences, considering meanings, and otherwise imposing order".

I used MAXQDA software to organise and analyse the collected data; this piece of software is considered one of leading pieces of software available for analysing qualitative data. MAXQDA enables me to code the data as much as desired and it allows for coded segments to be grouped under a common theme. Furthermore, this software allows me to transfer any field notes from his interviews to the software and it can create memos and assign them to a particular code, theme, or interview.

4.5. Ethical considerations

I completed all the ethical requirements stated by the research policy of Bournemouth University. This included filling the ethical checklist and the presentation of the research to the university ethical committee before commencing the research fieldwork. One of the main requirements of ethical committee was to give participants an information sheet, which provided details of the study and the reasons for selecting them to participate in the research. Once this was given them, I was obliged to answer and explain any inquiries from the participants and had to ensure that all participants understood the research's aims and objectives. Next, I asked each interviewee to fill the participant agreement. The participant agreement form informed the participants about their right to withdraw at any time up until they signed the consent form, also included was their right to refuse to answer any questions.

4.6. Conclusion

This research aimed to examine data journalism practices in the GCC. A mixed methods approach (quantitative followed by qualitative) was chosen in order to achieve this. The mixed methods approach was the most appropriate choice since there is currently little known about data journalism in the GCC. Therefore, phase one of the research aimed to answer RQ1, while providing a contextual background about the region and defining patterns that needed to be addressed in the second phase of the research, such as the reliance on websites as a source of information.

Next, this chapter discussed the research design (exploratory) which was chosen for several reasons. One of the main reasons was the deficiency of scholarships regarding data journalism in the GCC, also it enabled me to be flexible and adaptable throughout the research since it allowed me to adjust the direction of the study when new evidence came to light.

Moreover, this chapter discussed the sampling approach, which was the relevance/purposive approach. I selected this approach since I was specifically looking for data journalism content in phase one of this research to evaluate data journalism content in the region, while helping to inform phase two of the research. In the second phase I intended to interview newsrooms personnel who had any involvement in the data journalism production, so that they could describe the required steps to produce data journalism content.

Also, this chapter highlighted some of the challenges that I had faced while conducting this research. One of the main issues was the political atmosphere in the region during the study, for instance I intended to include five countries of the GCC in the study, however due to a diplomatic crisis between Saudi Arabia and Qatar, I was left with no choice but to drop Qatar from my research. Furthermore, I had intended to use the same newspapers from phase one in phase two, however the Alwasat newspaper of Bahrain was suspended before conduction phase two, so I had to replace it with another newspaper in phase two.

This chapter concluded with the ethical considerations that I had to keep in mind, in order to follow the research policy on ethical requirements set out by Bournemouth University.

5. Findings

This chapter will display the findings from phase one and two of this research. In phase one I conducted a quantitative content analysis of five news outlets in the GCC. While in phase two I carried out fieldwork involving semi-structured interviews with senior level editors, journalists, designers, and other workers dealing with data journalism projects in the newsrooms. In the first section of this chapter, I will present the findings of the quantitative content analysis, which includes units of analysis, such as types of stories, types of data visualisation and sources of information. Also, I will link the findings of the content analysis with the existing body of literature in order to interpret the findings of the content analysis.

In the second section of this chapter, I will present the findings of phase two of this research. The findings of phase two include how newsroom workers conceptualise data journalism and what motivates them to use this type of journalism. It will also provide an insight into data journalism taxonomies and workflow in the studied newsrooms. Following this, this chapter will describe, in depth, the process each room follows in order to produce data journalism content. This chapter will also discuss the issues and challenges that data journalism production faces in the analysed newsrooms; this includes the following challenges: challenges regarding the journalistic role and newsroom workflow, challenges regarding data and its access, institutional challenges, challenges caused by the government's impact on newspapers and the challenges caused by economic pressure. Finally, this section will discuss the findings in relation to the existing research, in order to distinguish data journalism practices in the GCC from practices in other contexts.

5.1. Content analysis

This section will present the findings of the quantitative content analysis based on the six units of analysis described in the previous chapter. The content analysis aims to draw a clear picture about the current state of data journalism content in the GCC, as well to provide a contextual background about data journalism practices in the region.

5.1.1. Types of stories

Table 7. Types of the stories that utilised in data journalism stories.

Types of the stories	Total sample N= 583	Alwasat N=324	Makkah N=222	Gulfnews N=10	shabiba N=3
News report	N.	13	3	0	1
	%	4	1	0	33
Feature article	N.	2	0	0	0
	%	2	0	0	0
Video	N.	0	0	0	0
	%	0	0	0	0
Gallery	N.	0	0	0	0
	%	0	0	0	0
Web documentary	N.	0	0	0	0
	%	0	0	0	0
Datavis article	N.	309	219	10	2
	%	95	99	100	67
Other	N.	0	0	0	0
	%	0	0	0	0

Created with Datawrapper

When analysing the types of stories appearing in newspapers, it became clear that data visualisation articles were the most commonly delivered form of data journalism. For instance, Gulf News (N=10) never used any other types of stories besides data visualisation articles. The other news outlets did not feature stories outside the news report and data visualisation categories. There was one exception, Alwasat who used feature articles in 2% of cases equal to only two articles in their coverage

In terms story of types, the data showed less use of news reports in data journalism stories, only accounting for 19 of 583 articles. This finding could reflect the nature of data journalism, which seeks a deeper insight into the covered topic (Reimold 2013) and requires more time and tools to produce (Fink and Anderson 2014, pp.467-481).

The data visualisation article was the most-used type in the analysed data, scoring around 100% in three out of the five newspapers. This finding is understandable because data visualisation has become an important means for telling complex stories with visual elements, this leads to a better understanding of the story's context. Data visualisation articles offer engaging and simple content, perhaps it is seen a realistic solution to information overload (Friendly and Denis 2001; Gray, Bounegru and Chambers 2012).

However, the lack of news reports in the sample could be attributed to several aspects, first the reliance on a national news agency as the main source of the news in each country. Usually, the news agency is part of the government and therefore aim to publish news that is in line with the government's agenda. Rugh (2004) considers the relationship between newspapers and governmental news agencies as one of the mechanisms that loyalist systems employ to influence media outlets, since it works as a guidance to newspapers on how to treat governmental news. Likewise, the newspapers lack of independence from the government as a source of income and information contributed to newspapers willingly accepting any governmental information as facts without questioning it or verifying it (Duffy 2013).

5.1.2. Subject

Table 8. Subject that covered in data journalism stories.

Subject		Alwasat N=324	Makkah N=222	gulfnews N=10	shabiba N=3
Entertainment	N.	4	29	0	0
	%	1	13	0	0
Lifestyle	N.	5	102	3	0
	%	2	46	30	0
World	N.	125	17	1	0
	%	39	8	10	0
Social issues	N.	23	7	0	0
	%	7	3	0	0
Science	N.	17	1	1	0
	%	5	0	10	0
Health	N.	17	33	0	0
	%	5	15	0	0
Politics	N.	28	1	1	1
	%	9	0	10	33
Sport	N.	23	2	0	0
	%	7	1	0	0
Financial	N.	77	11	3	2
	%	24	5	30	67
Religion	N.	2	1	1	0
	%	1	0	10	0
Other	N.	3	18	0	0
	%	1	8	0	0

Created with Datawrapper

This unit of analysis pertains to the subjects covered by data journalism stories in the GCC news outlets' content. This unit contains 11 subcategories:

1. Entertainment: articles that discuss entertainment-related stories, such as music and movies
2. Lifestyle: articles that discuss people's hobbies and interests, such as travel and food
3. World: articles that provide an international context, either specific countries, comparisons between two countries or countries' rankings
4. Social issues: articles that cover cases that might affect people negatively or positively, such as poverty, the environment, education and housing.
5. Science: articles about new inventions and discoveries in chemistry, physics, and mathematics
6. Health: articles that provide health-oriented content, such as healthcare and medicine
7. Politics: articles that offer content related to a country's policies, such as political parties and elections
8. Sports: articles that discuss sports-related stories, such as tournaments and competitions
9. Finances: articles that provide financially oriented content, such as prices and incomes
10. Religion: articles that discuss religion, faith, and beliefs

The sample analysis showed that data journalism appeared most often when the articles focused on the following subjects: world, finances, social issues, and lifestyle. Meanwhile, data stories were never used to cover certain subjects, such as entertainment and science.

The Makkah newspaper sample (N=222) had a clear focus on lifestyle, with 46% of their 222 published articles being lifestyle pieces. During the selected timeframe, 125 of

Alwasat's 324 stories were global in nature, and they accounted for 39% of their total articles. The second most-covered topic for Alwasat was finances, representing 24% of their total stories.

This data analysis revealed some noteworthy points about the subjects covered in data journalism stories. For instance, 125 out of 324 of Alwasat's stories were about the world, which represented the most common subject covered by the newspaper. This focus results from the fact that Alwasat relies heavily on outsourced data journalism pieces produced by Reuter's wire service. Reuters produced 234 of Alwasat's 324 articles, which is equivalent to 72% of their stories. Internally, however, the most popular data stories fell under the world and sports categories, with 26 of its 82 stories focusing on the world and 15 concerning sports topics. For world stories, it is worth noting that Reuters produced 98 out of 125 of Alwasat's published stories. Reuters also produced 69 out of the 77 finance stories published by Alwasat.

The Makkah newspaper most often focused on the subject of lifestyle; usually, these articles discussed personal development and skills. This newspaper also placed a heavy reliance on websites for information in their stories: 68 of 102 lifestyle stories relied on information obtained from websites. Makkah's second most website-reliant subject was health. Web sources were used in 22 of 115 articles related to health.

Looking at this data concerning the subjects covered in data journalism in the GCC nations, several patterns appear and provide an insight into how data journalism is practised in this region. First, newspapers such as Alwasat and Makkah tend to utilise data for softer types of articles rather than more serious news stories. For example, Makkah and Alwasat each published around 20 stories about the world during the selected timeframe. In finances, Makkah ran around ten articles, while Alwasat only ran 3 out of 77 during the same period. These numbers include only stories produced internally for both newspapers. Second, in the case of

Makkah, there is clear evidence of journalistic efforts to produce this type of content, but the focus on producing soft news stories might undermine this serious journalistic work. Therefore, the journalist's role as a truth seeker might be lost in the process, and journalism might serve as "A press of opinion rather than as a news-imposed press" (Al Yasin 2014, p. 16). Although Alwasat published more world stories than any other topic (125 of 324), 98 of these stories were produced by news agencies rather than by the newspaper itself. By way of contrast, world stories in Western newspapers tend to rely heavily on data journalism, perhaps due to the notion that it might serve as a watchdog for governmental performance (Knight 2015). For instance, Zamith (2019) found that The Washington Post and The New York Times placed emphasis on hard news topics in their data journalism content, with The Washington Post having published around (74%) and The New York Times (60.0%) of their data journalism contents based on hard news topics.

The focus on subjects such as lifestyle, entertainment and world, and the lack of focus on subject that concern local audiences such as social and political issues is an indication of how journalists in the GCC tend to avoid controversial topics. This avoidance does not appear from a vacuum, but rather it has its roots in the GCC that was inspired by self-censorship and the vagueness of media laws in the region (Rugh 2004; Al Yasin 2014). This is unlike the Western counterparts, where journalists search for hard-to-get data with the assumption that this kind of data tended to be more controversial (Fink and Anderson 2014).

5.1.3. Data visualisation

This unit of analysis relates to the type of visualisation that were used in data stories in the GCC's content. This unit contain the following 14 subcategories:

Table 9. Data visualisation Criterion

Type of Data visualisation	Criterion
Diagrams/graph/chart	Showing relationships between numbers (Knight 2015, p.61) Graph-based (e.g., family tree, flow chart). Chart-like (e.g., pie, bar, line, bubble chart) Tree map, text cloud, timeline diagram, moving/static (Weber and Rall 2012 b, p.7)
Maps	Dynamic map: showing both location and other data such as amount or date. Static map; showing the location of an event (Knight 2015, p.61)
Plans	Construction plan e.g., of an airplane, building or site plans, moving/static. (Weber and Rall 2012 b, p.7)
Infographic	A combination of pictures and numerical information, table of figures, a list of numbers and a numerical pull quote (Knight 2015, p.61). Comic style, pictogram style, metaphors, technical drawings, animated graphics and dynamic (Weber and Rall 2012 b, p.7).
Textual analysis	Where the numbers are discussed within the text, but not otherwise represented (Knight 2015, p.61).
Timeline	Which shows events listed by date, whether continuous or not (Knight 2015, p.61).

Number pull quote	A single numerical fact, presented out of context and without comment (Knight 2015, p.67).

The analysis has revealed that new stories sometimes use more than one type of data visualisation. Alwasat's data revealed a balanced selection between four types of data visualisation: map, graph, chart, and other types of infographics. Alwasat used maps 96 times, equal to 30% of their data visualisation types. For the other three data visualisation techniques, Alwasat used each one about 25% of the time. The publication used maps 75 out of 96 times as a means of visualising a world subject; Alwasat also used graphs and charts in the same news stories 25 times.

The analysis of Makkah's stories showed a great reliance on infographics in its different forms. Infographics accounted for 185 of 222 (83%) of their data visualisations. It is also worth noting that the how-to (process-oriented) infographic was the most-used type of data visualisation. It was used 93 times, 58 of which were infographics on the subject of lifestyle.

Alwasat utilised maps most often in their stories' data visualisations due to their ability to be converted into an interactive form, thus enhancing comprehension of the content considerably (Burmester, Mast, Tille and Weber 2010, P.361-368). Maps also represent a unique data tool, enabling journalists to highlight several patterns and trends in data, such as geolocation information (Parasie and Dagiral 2012, P.853-871).

Table 10. Data visualisation that used in data journalism stories.

Data Vis		Alwasat N=324	Makkah N=222	Gulfnews N=10	Shabiba N=3
Map	N.	96	2	1	0
	%	30	1	10	0
Graph	N.	78	4	0	1
	%	24	2	0	33
Chart	N.	86	5	0	0
	%	27	2	0	0
Combination info	N.	28	31	3	2
	%	9	14	10	67
List	N.	0	4	0	0
	%	0	2	0	0
Number pull quote	N.	2	7	0	0
	%	1	3	0	0
Table	N.	8	0	0	0
	%	2	0	0	0
Textual analysis	N.	0	1	0	0
	%	0	0	0	0
Timeline	N.	14	7	1	0
	%	4	3	10	0
Plans	N.	3	1	1	0
	%	1	0	10	0
VS info	N.	24	2	1	0
	%	7	1	1	0
How-to info	N.	12	93	2	0
	%	4	42	20	0
Did-You-Know info	N.	18	59	2	0
	%	6	27	20	0
Other	N.	0	9	0	0
	%	0	4	0	0

Created with Datawrapper

Makkah mostly used infographics for its stories. This reliance on infographics might be justified by the fact that infographics are considered a unique type of data visualisation. They have the ability to integrate more than one element of data visualisation. They usually consist of three main parts: a visual, content and knowledge (Siricharoen and Siricharoen 2015). Furthermore, infographics have the capability of getting the reader's attention by offering enjoyable content while delivering easier-to-understand facts (Siricharoen and Siricharoen 2015). Also, the reliance on infographics is not unique to the content produced in the GCC, for instance around 55% of data journalism content in Chinese news outlet was delivered by utilising infographics (Zhang and Feng 2018). In addition, data journalism in the Greece in its initial form was based on the use of infographics to provide information (Veglis and Bratsas 2017).

5.1.4. Graphic text relationship

Table 11. Graphic text relationship in data journalism stories.

Graphic text relationship		Alwasat N=324	Makkah N=222	gulfnews N=10	shabiba N=3
Text + datavis	N.	4	162	0	0
	%	1	73	0	0
Text+images+datavis	N.	0	0	0	0
	%	0	0	0	0
Text+videos+datavis	N.	0	0	0	0
	%	0	0	0	0
Text+images+video+datavis	N.	0	0	0	0
	%	0	0	0	0
Stand-alone datavis	N.	320	60	10	3
	%	99	27	100	100

Created with Datawrapper

The data analysis of news outlets showed that Alwasat tends to greatly rely on the utilisation of stand-alone data visualisation. Such visualisations are published without any other graphic modes, either to provide an explanation or to back up the data story. According to the Data Journalism Handbook, data visualisation is usually embedded in articles to provide support to the main stories (Gray, Bounegru and Chambers 2012). The reliance of Alwasat on stand-alone data visualisation conflicts with this purpose. Makkah commonly used text, which represented about 70% of its stories. However, the text in Makkah's coverage tended to repeat the content contained in the data visualisation, rather than provide additional or new information.

5.1.5. Sources of information

Table 12. Sources of information that used in data journalism stories.

Sources of information		Alwasat N=324	Makkah N=222	gulfnews N=10	shabiba N=3
self-generated	N.	5	31	1	0
	%	2	14	10	0
Government	N.	93	15	0	3
	%	29	7	0	100
Corporate entities	N.	56	12	4	0
	%	17	5	10	0
Research institutes	N.	41	5	0	0
	%	13	2	0	0
Non-profit groups	N.	16	3	0	0
	%	5	1	0	0
Pan-national organisations	N.	61	1	0	0
	%	19	0	0	0
News agencies	N.	96	2	0	0
	%	30	1	0	0
Website	N.	11	115	1	0
	%	3	52	10	0
Source not indicated	N.	29	14	4	0
	%	9	6	40	0
Other	N.	17	29	0	0
	%	5	13	0	0

Created with Datawrapper

It is clear that these news outlets depend on different sources of information for their data journalism stories. In some articles, there was more than one source of information.

The data showed that Alwasat newspaper generally depends on the government or news agencies to obtain story information. For instance, the government was the source for 39 world stories, while the news agencies were the source of 53 world stories. It is also worth mentioning that Alwasat was the news outlet most likely to cite pan-national organisations; they were used in 61 out of 324 (19%) stories.

As for Makkah, the data analysis revealed that this newspaper depends heavily on websites for information, representing approximately two-thirds of its stories. Makkah used the following genres of websites in its stories: blogs, lifestyle, health, education, technology, social networking, business as well as others. Makkah used lifestyle websites the most, representing 40 of the 115 (35%) articles. The second most-used website type was health websites, used in 18 of the 115 (16%) newspaper articles.

It is apparent from the analysis that Alwasat and Makkah do not rely greatly on the government as a source of information for their data stories. For instance, only 8 of Alwasat's 82 self-produced stories were sourced from the government; meanwhile, in Makkah, 27 of 222 stories used governmental sources. This finding might result from the lack of freedom of information and freedom of the press, forcing journalists to turn to other sources for news, such as news agencies and websites (Sakr 2003). In a similar vein, the non-reliance on the government as the main source of information is also common in other non-Western countries, for example around 47% of data journalism content of Chinese news outlets were sourced by non-governmental agencies (Zhang and Feng 2018). In contrast, data journalism content in Western outlets tends to rely on government data, for instance Knight (2015) and Tandoc and

Oh (2015) found that the government and its agencies were the most used source of information for data journalism content.

The data also shows that all these news outlets rely on secondary data for their data journalism stories. This finding is understandable because one of the main features of data journalism is the ability to work with existing datasets rather than building new ones from scratch (Mair and Keeble 2014). Also, the body of research into data journalism indicates that there is a reliance on available open and public data since it is more accessible and is already processed (Parasie and Dagiral 2013; Tabary et al. 2015).

Furthermore, the limited workforce and strained financial resources might be a hindrance to newspapers seeking to develop their datasets (Fink and Anderson 2014, pp.467-481). Such circumstances may call into question the position of data journalism in such newspapers. Some scholars even argue that the emergence of data journalism has affected the traditional role of journalists, who are now required to invent innovative ways of finding news stories, such as through data mining (Zander and Mosterman 2013).

The data showed that there is a reliance on secondary data for data journalism content in the sample of this study, where governments and websites are the main contributor to journalists. On the other hand, news outlets rarely rely on primary data/self-generated data, despite the existence of open-data platforms. This is can be explained by several factors, such as the dependence on governments as a source of income and information and the existence of a censorial culture among the GCC journalists (Amin 2002). The unclear rules of censorship impacted journalists' professionalism, as well as complicated journalists' jobs, where at times certain stories are rejected in final stages without apparent reason. Therefore, journalists tend to avoid topics that not sourced by the government in order to save their efforts as well as to protect themselves (Awad 2010).

5.1.6. Sources of production

Table 13. Sources of production of data journalism stories.

Source of production	Alwasat N=324	Makkah N=222	Gulfnews N=10	Shabiba N=3
Internal production	81	222	3	3
Government	0	0	0	0
Corporate entities	0	0	2	0
Research institutes	0	0	0	0
Non-profit groups	0	0	0	0
Pan-national organisations	0	0	0	0
News agencies	234	0	2	0
Source not indicated	0	0	3	0
Other	3	0	0	0

Created with Datawrapper

The data reveals that three of the news organisations produced their data journalism stories internally. In contrast, Alwasat relied heavily on outsourced data journalism pieces, including wire services like Reuters, which accounted for 234 of the 324 (72%) stories.

5.1.7. Conclusion

This chapter presented findings from a quantitative content analysis of several news outlets in the GCC. This analysis took place from September to December 2016. The sample under analysis contains five news outlets (four newspapers and one news website), representing five out of six states in the GCC region. Only Kuwaiti news outlets go unrepresented in the sample because there were no published data journalism articles during the selected timeframe.

To conclude, it is clear that data visualisation articles were the most common type of data journalism, outscoring other types of stories, such as news reports and feature articles. As for data journalism content, the world was the most-covered subject, accounting for 151 out of the 583 stories during the timeframe. Furthermore, maps and infographics were the most-used type of data visualisation in the samples, and most news outlets tended to utilise stand-alone data visualisation in their content. Interestingly, the most common sources of information in data journalism stories were the government and websites. Most of these news outlets produced their data journalism in-house rather than relying on out-sourced materials. Also, it is worth noting that none of the news outlets provided a direct link to the original data. This is something that contradicts Aitamurto et al. (2011) workflow of best practices in data journalism which asserts that offering the original datasets will enhance the transparency and credibility of the news organisation.

Overall, the research has shown that there is positive movement toward implementing data journalism in the region. However, some news organisation like Makkah tend to utilise this type of content merely for softer news. Meanwhile, other outlets like Alwasat tended to use out-sourced materials rather than produce original content.

This content analysis aimed to provide a background of data journalism practice in the GCC, allowing me to contextualise and inform the second phase of the research. It provided an overview that enabled me to form my interview questions and discover patterns in the data that he needed to be addressed in the second phase of the research. The content analysis also facilitated the selection of mixed method as the research methodology, where the quantitative approach helps to inform and developed the qualitative approach. The mixed method also allows for an in-depth exploration of some issues that were raised in the quantitative stage (Greene et al.1989; Matthews and Ross 2010; Saunders et al. 2016).

5.2. Qualitative analysis

In this section the findings from the semi-structure interview will be presented; these is divided into three themes: data journalism concept, newsrooms taxonomy and issues and challenges. The first theme will provide an in-depth insight of how newsrooms workers conceptualise data journalism, it will also examine the journalist's motivations to use data journalism in their content. Theme two will detail each newsroom's taxonomy and workflow, it will also highlight any issues or shortcoming about the existing taxonomies and workflow. In theme three, I will identify the issues and challenges that data journalism faces in the GCC, while pointing to how journalists deal with them.

5.2.1. Data journalism concept

Conceptualising data journalism is important to enable me to have a good insight about it, as any emerging field the conceptualisation of data journalism will aid in clarifying any misunderstandings regarding it. Once the concept has been conceptualised, researchers will be able to examine its functionality within newsrooms, which will in turn provide a clearer path for its implementation. This includes the appropriate structures of data journalism units/teams in newsrooms, it also identifies the required skills that the data journalism units/teams need to have in order to work on data journalism projects. Moreover, knowing how data journalism functions within newsrooms will allow researchers to identify any obstacles that hinder newsrooms from integrating data journalism practices in their content. This is useful because it will highlight the steps organisations take to overcome any problem when introducing data journalism practice in their newsrooms (Boyles and Meyer 2017). Furthermore, the conceptualisation of data journalism will aid researchers attempting to define it; this is an important part of setting it apart from other forms of journalism, such as Computer Assisted Reporting (CAR) and Computational Journalism (CJ). This move will help researchers clarify the ambiguity regarding this emerging field of journalism, which in turn will help form an appropriate definition of this type of journalism (Borges-Rey 2017). Since defining data journalism will aid scholars in distinguishing its framework and its elements, such as data visualisation and interactivity, it will also provide a set of characteristics associated with this form of journalism, such as open source and transparency (Zamith 2019). Another benefit of conceptualising data journalism is that it will reaffirm the role of journalists and journalism as a watchdog and fourth estate in their societies, and it is important to maintain the traditional journalistic skills while introducing new methods of reporting, such as data journalism (Felle 2015). Finally, the conceptualisation of data journalism will enable researchers to identify the main aspects of data journalism, such as audience engagement and the simplification of complex datasets; this in turn highlights the newsrooms' motivations for adopting this form of journalism (Felle 2015).

Based on the above reasoning, this section will investigate how data journalism is viewed, understood, and operationalised within GCC newsrooms. It will also highlight the motivations behind newsrooms introducing this type of journalism in their practises.

5.2.1.1 How journalists conceptualise data journalism

Most of the interviewees viewed data journalism as a journalistic role that is based on finding stories from data, however there is a different level of understanding among some of them in terms of identifying the data as numerical information. Lewis and Waters attribute this to rich range of skills and formulae used in data journalism, which make it difficult to accurately define and conceptualise the concept (Lewis and Waters 2017). The confusion in distinguishing data from numbers is one of the most common dilemmas that people working with data face. For instance, one of the interviewees (SR2) saw data journalism as any statistics, graphics, maps and comparisons, while another interviewee (J5) defined data journalism as any set of numbers that could be used to tell a story after analysing it:

"Data journalism is a set of numbers that you can manipulate to create a story" (DJ1)

On other hand, interviewee (SR1) compared data journalism to investigative journalism, which usually starts with an idea then moved on to collecting suitable data for the story:

"Data journalism is similar to investigative journalism; at the start you should have an idea then you collect data based on that idea." (SR1)

Another interviewee saw it as an easy, quick and direct way of delivering information, which was something essential in this new era of news:

"Data journalism provide a numerical information that quick, easy, and direct for the readers." (J5)

When analysing the findings, it looks as though there is an agreement that data journalism is an easy, quick, attractive, and direct way to deliver the story, thus helping the story's readability and shareability. The findings also showed that data journalism helps the reader understand the data through utilising the data visualisation. The utilisation of data visualisation can enhance the understanding of data, since data visualisation enables readers to gain a better overall picture of the data. Through data visualisation, readers have the capability to comprehend the patterns and trends within the data, which they may not necessarily understand with another format of storytelling (Gray, Bounegru and Chambers 2012).

In contrast to the above, interviewee J6 viewed data journalism as a new style of journalistic practises where the development of technology in newsrooms has led to its emergence, believing the era of social media newspapers has forced news outlets to implement this new style of journalism in order to maintain its role as a source of news:

"Everything has moved to the online form, to be able to read and interact you need to be online." (J6)

The introduction of new technologies and tools in newsrooms have helped facilitate the implementing of data journalism practises globally, this in turn has enabled data journalists quicken data journalism production (Zander and Mosterman 2013).

Having said this, one of the interviewees (D2) argued that there is no existence of data journalism in the GCC. This interviewee stated:

"Data journalism does not exist in the GCC's newsrooms, in its current form only seek to present its content beautifully rather than executing a proper data journalism process." (D2)

A senior level editor in the newspaper (SR1) where the previous interviewee worked mentioned that they focus on both the content and the format of data journalism pieces, since in some cases journalists focus only on the beauty of the data visualisation while ignoring the quality of the content. This type of practise can eventually undermine the value of the data visualisation and could lead to people carrying a negative association for any data visualisation. Therefore, this editor thinks that the content and the format of data journalism pieces should be parallel in order to preserve a perfect balance; this indicates that there is a premonition in the newspaper about the aforementioned observation.

"How you can add value to the journalistic piece using data journalism, we don't want the reader to be impressed only by the beauty of the content's presentation but also we want him to be attracted to the content as well" (SR1)

5.2.1.2 Data journalism as a storytelling tool

In terms of using data journalism as a storytelling tool, there were mixed opinion among the interviewees. Some of them saw the content of data journalism as a stand-alone story, which did not need any accompanying text. There are several reasons behind that; firstly, it makes it easier to share as a snapshot on the social media, such as Twitter and Facebook. Secondly, there are numerous websites who specialise in providing stand-alone data visualisations to news outlets. As we are living in a time where people lack the desire and time to read the traditional long form of a news story, there has been an emergence of stand-alone data visualisations as a reaction to this and to reach as many as possible readers. Thirdly, any content that requires an accompanying text to describe it or to support it is considered as weak content, since one of the main elements of data journalism is to simplify the story and if you provide an extra text alongside it, it will be a case of oversimplification (Dur 2012). Despite this, some of the interviewees thought that data journalism content should be accompanied by a text, either to describe it or to support it. They supported this for several reasons; firstly, the stand-alone content might lack the information and depth that would help understand the story. Secondly, also gives the reader a brief about the story and how it has been developed. Moreover, sometimes the story has a lot of information and it is hard to fit all the details in the data visualisation. In terms of shareability, this side suggested that the data visualisation should tell most of the story by itself and the accompanying text should support it if needed.

"any journalistic product that require further explanation is a weak product, therefore the data content is supposed to deliver the information in its own without any added elements." (DJ2)

"it can be a stand-alone content if its details are clear and obvious, for instance, if I wrote an article about the VAT (value added tax) the readers may not understand the idea of the article, unlike if I use the data visualization to explain and describe it, which will allow them to understand it." (J5)

"it cannot be as a stand-alone content, yes it allows the journalists to tell his story by adding some attractive elements, but you cannot tell a story by using only the data." (J6)

5.2.2. Motivations of the usage of data journalism

In terms of the motivations of utilising data journalism in the GCC's newsrooms, interviewees had several reasons which inspired them to implement this type of content/practises in their newsrooms.

5.2.2.1 Clarity and simplification

Data journalism gives more clarity to the content, in other words, data journalism can simplify complex context such as huge databases. Since the data journalism team will analyse and show the data in a visual perspective, this will allow the data to be broken down and more easily digestible and comprehensible. In addition to this, the readers will be able to clearly get the gist of the story in a much quicker time by only looking at the data visualisation, since data visualisation simplifies the data of the story.

"the process of converting text to visual require me to understand the data and find a way to simplify it for the reader, so he can understand it easily" D8

"we use data journalism because it provides the information to the reader clearly and rapidly, when the data is clear and accompanied by visualisation it is easy to understand." (SR2)

5.2.2.2 Data visualisation

The interviewees viewed data journalism as an important tool that attracts readership and increases the content shareability, since data visualisation allows newspaper to create unique and attractive content that attracts people. Not only does the content attract readers, but it also offers them an easy way to share it through social media platforms. An interviewee (DJ2) mentioned that data visualisation can allow the newspaper to uphold its identity by establishing a standard which data designer follow. Another interviewee (D2) who works in the newspaper layout department said that the newspaper encourages creativity in the design, but the design must also be in line with the newspaper's style. In addition, interviewee D7 suggested that data visualisation will add value like grabbing the reader's attraction to the news story, which is lacking in the plain text approach.

Newsrooms in the GCC rely on mobile phones as a means to access social media platforms, therefore they are keen to make their content mobile friendly so that they can boost content shareability. An interviewee (J6) said that mobiles are an important part of being active online or on social media platforms, he added that everything can and is read on the mobile, such as reading books, bills and work emails. Another interviewee (D6) mentioned that mobiles enable readers to share and store data visualisation content and that this content tends to be easy to read and understand.

In an age where people have slowly lost their desire to read newspapers, news outlets have been forced to implement new methods of journalism in order to maintain its readership, for example by establishing itself on social media platforms. A senior level interviewee (SR1) mentioned that his newspaper developed a new strategy in terms of designing data visualisation; designing data visualisations that fit on to mobile screens, they have also created a dedicated Twitter account devoted to data visualisation content. The motive for this strategy was to make it easier for readers to see data visualisation and get the full picture without having to scroll around and gather information from multiple sources. Furthermore, this account only allows the user to find data visualisation content without any interference from the newspaper's other content.

5.2.2.3 New trends

Interviewees considered data journalism as a new trend/style in the journalistic profession. They saw this as one of the motivations and advantages of utilising data journalism in the GCC's newsrooms. One of the interviewees (J5) argued that adapting the new trend/style brought the newspaper closer with its target audience by offering them the latest trend in journalism, instead of letting them seek it in other newspapers. Also, adopting this new form of journalism showed its readers that the newspaper has the capability to keep up with the evolution of the journalism industry. Furthermore, this interviewee disagreed that implementing data journalism was a matter of survival, he claimed that implementing such a practise will not help a declining newspaper to survive.

"If I provide to the reader a news piece based on the old method that has 2500 words and one image, he will not read it." (J5)

"new and easy way to tell the story, and it is shareable in the social media." (DJ3)

5.2.2.4 Competition

Other interviewee (SR1), who worked for a newspaper established in 2014, agreed that introducing data journalism in their newsrooms allowed newspapers to compete with its competitors, especially with the existence of online newspapers and citizen journalism which allow for the news is being shared more rapidly. So, the newspaper opted to move from the classic way of publishing newspapers in order to be compete in the industry. This interviewee thought that data journalism was the future of journalism and was more convincing for readers due the fact that readers tend to trust numbers and statistics.

"As a newspaper we were recently established in a period where some newspapers close, now there are prevalence of online newspapers and citizen journalism who can easily provide people with information utilising social media platforms ……. As a new newspaper, we abandoned the classic way to deliver the content and we relied on data visualization to deliver a concise news pieces that appealing to the readers. We were encouraged to do so due to fact that people lost the desire to read "(SR1)

"the adapting of data journalism in our newsroom was not a surviving matter, but rather it become a competition matter. Any newspaper old or new adapted data journalism in order to stay competitive, since it became the only way to stay relevant." (SR3)

5.2.2.5 Information overload

The interviewees saw countering information overload as one of motivations and advantages of utilising data journalism in the GCC's newsrooms. Data journalisms enables newspapers to provide condensed news content, which is easy to consume and understand. In the era of excess information, readers seek direct and precise news content that cuts out the excess, data journalism is able to fill this desire of theirs, since it can include vast datasets in one story. Several interviewees agreed that readers are easily bored nowadays, so they tend to avoid long articles and usually seek short and condensed articles that require less time to read and observe. Thus, data journalism is capable of delivering the information required in the right time, amount and shape, therefore enhancing the contents readability amongst the papers' readers.

> *"Readers feel that brief information is more acceptable, which in turn encourage us to adopt this style so we can satisfy them. The data visualization allows us the summaries a thousand words into one image or figure, which allow the information to be direct and understandable." (SR1)*

5.3. Newsrooms Taxonomies

Data journalism as a practice involves several aspects that allow researchers to identify the ideal practice and set boundaries for this emerging field. The first aspect is related to the use of data in the news story; data can be the source of data journalism content and it can be the tool which tells the story (Gray, Bounegru and Chambers 2012. In other words, data can play a supporting part in the story, working as a source for the data visualisation content, or it can be the story as a data driven story (Royal and Blasingame 2015). It seems possible these approaches can be described as passive and active approaches; in the passive approach, newsrooms tend to work with the existing news agenda and find appropriate data that can support or enrich the news story. Meanwhile, the active approach tends to examine the available data, in order to find patterns that are considered newsworthy. For instance, datasets provide the required information of a story that has already been discovered by the newsroom, or it can work as a starting point for the whole story (Aitamurto et al. 2011).

This figure was redacted for copyright purposes

Figure 3. Data journalism workflow (Veglis and Bratsas 2017).

The second aspect is considering the workflow of data journalism in the newsrooms, which investigates the steps that newsrooms take to produce data journalism content. Veglis and Bratsas (2017) propose a data journalism workflow that includes six stages: data compilation, data cleaning, data understanding, data validation, data visualisation and article writing. Veglis and Bratsas' workflow is somewhat similar to the workflow put forth by Aitamurto et al. (2011), the only difference is that Aitamurto et al. added a step where news organisations publish the datasets, they used in creating the content and then invite its readers to reuse the data (Aitamurto et al. 2011).

Both workflows highlighted that the having an idea of a story as the starting point for any data journalism content allows newsrooms to identify the potential role of the data in the story. Meanwhile, the remaining steps in these workflows focus on acquiring, preparing, and handling the data that newsrooms want to use in the story. Both Veglis, Bratsas and Aitamurto et al. agreed that the final part of their workflows is concerned with data journalism production and includes data visualisations and article writing. However, Aitamurto et al. (2011) mentioned that some news organisations have identified some best practices in the data journalism workflow; these include; conducting the analysis instantly, making the data easily accessible via API or making the data more shareable by other ways, reusing the data, either by creating different visualisations or by analysis, using the metadata, classifying data with country or institution codes to make the data easier to find and allowing readers to participate by offering them different platforms (Aitamurto et al. 2011).

The third aspect is related to data journalism models and newsrooms integration and approaches. Uskali and Kuutti (2015) examined several newsrooms in Western countries and proposed three models of data journalism. First, the traditional data desk model, which describes the newsroom that lacks a proper data journalism unit or department or in some cases it lacks the qualified personnel to work on data journalism content (Uskali and Kuutti 2015). Despite the lack of specialised department and personnel who work with data, these newsrooms still produce data journalism content by relying on an individual or collective effort. Second, the flexible data projects model, which describes newsrooms that have an assigned department and staff to conduct data journalism tasks, such as data analysis and visualisation, also it recruits coders to work on its content (Uskali and Kuutti 2015). Third, the entrepreneur model or the sub-contractor model, which states that data journalists usually work for different news organisations on different data projects. Uskali and Kuutti (2015) went on to argue that data journalism practice could merge into the common newsrooms' practices over time and form old 'traditional' newsrooms. They attribute this prediction on the ability of journalists to obtain the needed skills to work on data journalism projects (Uskali and Kuutti 2015).

Implementing data journalism practice in newsrooms follows several steps; these steps are unique to each newsroom. Boyles and Meyer (2017) listed four steps that allow newsrooms to integrate data journalism practices in the newsroom. The steps they outlined follow a liner path, which help newsrooms to implement and expand their data journalism practices (Boyles and Meyer 2017). The four steps are: exemplary effort, solitary practice, embedded collaboration, and data unit. The exemplary effort means that the newsrooms existing staff work on data content in addition to their other assigned work. These workers are usually data advocates and work on data content in their spare time, they also usually conduct data collection that is related to their assigned work. Solitary practice is where newsrooms recruit data journalist and assign them to data content full-time, they also task these staff to work on a variety of story subjects across the newsroom. Embedded collaboration is where the solitary practitioner identifies staff who are also data advocates in the newsroom and then seeks their collaboration, to form a partnership that allows the newsroom to allocate simple data content to other newsroom staff, while enabling the data journalist (solitary practitioner) to work on special or complex data content. The data unit refers to newsrooms that establish a data unit within their newsroom structure; this unit is independent from any other tasks that are unconnected to data journalism content. Boyles and Meyer (2017) argued that the existence of investigative units in the newsrooms will allow for a natural and easy transition to implementing data journalism practices, since data journalism is perceived as an extension to the work done by the investigative units (Boyles and Meyer 2017).

There are two main approaches in relation to how data journalism in being produced in newsrooms: a) teamwork approach b) do-it-yourself approach. The teamwork approach involves several newsrooms staff working on data journalism projects; this approach is common in well-resourced news organisations such as The New York Times (Wright and Doyle 2018). In contrast, the do-it-yourself approach means that only one journalist produces data journalism content; this approach is frequent in many news organisations and has resulted in great success. For instance, 9 out of the 26 Canadian finalists and winners in major national and international awards for data journalism between 2012 and 2015 used this approach to produce their content.

The number increased to 15 out of 26 for projects that involved two journalists working on it (Young et al. 2017). Scholars attribute this success to the freely available tools such as Google Maps and the rise of the open-source environment, which is one of the main catalysts that actually led to the emergence and expansion of data journalism across the globe (Wright and Doyle 2018; Young et al. 2017).

In this context, the creation of a taxonomy of data journalism practices in the GCC's newsrooms is a crucial part of establishing a foundation for this field in the region. The classification of the practice enhances its practical and theoretical elements, which in turn helps the academics and industry personnel in examining and evaluating this field (Bailey 2003). Furthermore, the creation of a taxonomy enables researchers to identify similarities and differences with any existing practices, which in turn can lead to a fundamental standardisation and definition of the field (Bailey 2003; Lemel 2014).

Therefore, I will create taxonomies of data journalism practises in the GCC's newsrooms, in order to identify how they map onto current data journalism practices. Likewise, it will help me examine any relationships among taxonomies and identify issues regarding them.

After analysing the sample of the study, I identifies four taxonomies of data journalism production in the GCC, although they are similar in their workflow, differences can be seen in the individuals who drive the data journalism production process. Each one of the created taxonomies follow a similar workflow and contains four steps: the idea of the story and the role of data, data collection and analysis, data visualisation and article writing. Despite the similar steps, each newsroom has a different way of executing each step.

This section will provide an insight into how each newsroom conducts their data journalism practises. I identify four ways of practising data journalism in the Gulf region. I will give a detailed description about each taxonomy, considering the issues regarding each one of them, such as the journalists' role in the production process. In addition, he will provide the workflow for each taxonomy, datelining the steps that have been taken to produce the data journalism content. Furthermore, this section will offer an evaluation/critique for each taxonomy based on the analysis of the workflow and the experience of the interviewees.

5.3.1. Data Analyst Driven Content (Makkah)

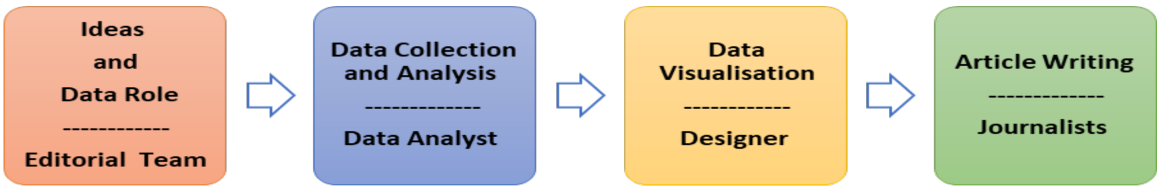


Figure 4. Makkah Taxonomy.

This taxonomy has four main elements: the editorial team, the data analyst, the designer, and the journalist, each of these individuals have a role in the production of data journalism content. The production of data journalism in Makkah newspaper starts with the newspaper's data analysts, who starts to collect the appropriate data for the news story. Not only does the data analyst collect the data, but this person is responsible for analysing the data in order to find interesting patterns that fit the news story. For instance, since the newspaper is based in Saudi Arabia, the data analyst will usually find existing data related to the country. Despite the fact that this process is data analyst driven, it usually starts with editorial team in terms of the ideas. However, sometimes the idea for a story occurs from the data analyst or a journalist, but the data collecting, and analysis will always be the data analyst's job. The team communicate with each other in different ways such as emails, Slack, WhatsApp, and phone conversations, however in some cases the associated personnel will have a meeting among themselves, and the volume of communication increases based on the amount of work that is required. Despite having a daily editorial meeting, which is exclusive for senior level staff, people who are working in data journalism are always briefed on the points discussed in meeting.

After collecting and analysing the data, the data analyst sends the data to the design team to create the data visualisation. Next, the data content will be sent to a journalist to write the accompany text, in some cases the data analyst will send the data directly to the journalist, in order to find the appropriate angle for the story before producing the data visualisation. However, in the data analysis and visualisation stage there is no direct involvement of the journalists. Although they can give their suggestions, the ultimate decision will be made by the analyst for analysis and the designer for data visualisation.

Makkah has two teams for DJ, with one specialising on producing hard news content which follows the taxonomy of analyst driven content. The other team focuses on producing soft news and follows a different approach for its production. Their approach tends to be more structure workflow of DJ, which start with an idea, writing it, collecting the data and data visualisation. Despite having two distinct teams, sometimes there is still some overlap between the two, for example, even when the other team produces their DJ differently, they still rely on the data analyst to find the required information/data. Therefore, the data analyst in Makkah is considered the main player in the production of data journalism content.

The idea for the data journalism content mostly emerges from the editorial team or in coordination with them since each idea needs to be approved by the editorial team. Usually there is a daily meeting for the editorial team where they discuss the idea and outline of the newspaper content, however this meeting lacks the participation from several members of the data journalism team, such as the data analysts and designers. Next, they assign it to the data analyst to collect and analyse the existing data, usually the data analyst will look for data in non-profit organisations such as UNESCO or governmental sources; they will also search for data in other sources such as foreign newspapers and news websites. In some instances, the data will be self-generated, either by a journalist or a data analyst, also sometimes the newspaper may consider collecting the data from serval sources as self-generated content. It is worth noting that the data analyst has the upper hand in terms of deciding the source of the information rather than the senior staff in the editorial team. This upper hand of the data analyst can be attributed to their superior ability in finding data or the understanding of what kind of data is working.

"I'm always in charge in term of collecting the data, senior personals do not ask me to bring it from certain place, sometimes I briefed them about the collection procedures and what sources I have used." (DJ1)

After collecting the required data, the data analyst will send it to an editor whose job it is to verify, proofread and edit the data. The Makkah newspaper considers the verification process as paramount to their data journalism production since inaccurate data could lead to chaos and misunderstanding. The verification procedure involves several aspects, such as tracing back to the original source of the data, to make sure it is a reliable source and the getting the editor to check the accuracy of the data analysis. Once this is done, the editor will post the data into Trello, which is a Kanban based tasks management application. Once the data is in the application, the designer can pick it up from there and begin work on it. The designer usually picks up the task that he/she prefers, however in some cases certain tasks are assigned to certain designers. After picking up the task, the designer will start creating the data visualisation with minimum involvement from the data journalism team, the designer is encouraged to be creative within whilst maintaining the identity of the newspaper. After creating the data visualisation (e.g., infographic, map or timeline), the designer will send it to a journalist or editor to write the accompanying text if required, then it is ready to publish. However, after completing the aforementioned steps, it is not necessarily a given that the data journalism content will be published, since it may get rejected by senior level staff from the editorial team due to its lack of providing new information or simply because the data visualisation overwhelmed and drew too much focus away from the content.

This workflow, however, was not seen as completely ideal in the opinion of several members of data journalism team. They highlighted some issues regarding this system. Individual J2 felt that the person who is working in data journalism need to be accurate to the maximum extent, since their accuracy will affect the overall credibility of the newspaper. Some people who work in data journalism are impacted by the time pressure of their deadlines and so they tend to rush ahead and inadvertently use incorrect data. Furthermore, J2 highlighted that the ideal style of data journalism content is for it to be concise, this was because nowadays readers tend to avoid long form of news content:

"Nowadays, the reader in the new technology and social media era do not like to read the whole piece, everyone is looking for the gist of the story and my job as a newspaper is to provide him with that." (J2)

On other hand, (DJ2) wanted the newsroom to focus more on the ideas of data journalism content and believed that the team should spend more time on this stage of the workflow. DJ2 thought that generating an abundance of ideas will improve data journalism production. Furthermore, he felt that the data journalism team needed to be trained and skilled enough to be able to capture data journalism content idea in their daily routine.

"I wish we allocate 50% of the time we spend on data journalism production on the ideas stage." (DJ2)

The Makkah taxonomy seems affective in terms of the quantity of their content; however, the newspaper tends to focus on soft news content rather than hard news content. The focus on soft news is not an unusual trend in the GCC nor in data journalism context in general. In the GCC context, scholars have argued that journalists have the tendency to avoid hard news reporting in order to stay on the good side of the ruling regimes (Amin 2002; Rugh 2004). While in the context of data journalism, the light form of data journalism (soft news) also exists in the Western context, for example according to Zamith's (2019) study into day-to-day data journalism in the New York Times and the Washington Post, around 31% of the New York Times content was soft news, whilst the figure was 25% for the Washington Post. Moreover, Borges-Rey (2016) found that data journalism content in the UK included three forms, one of which was the light, editorialised and entertaining form of data journalism.

Also, Makkah's data usually lacked depth since it as mostly sourced from websites. Based on my content analysis of Makkah's data stories, it was found that the newspaper used websites as a source of information in 52% of their stories. This model has several issues, especially the role of journalists in the process of data journalism production, which in turn could potentially affect the quality of the content. This model minimises the role of the journalist in the process since the journalist's role come into play the latter stages, such as writing the text that describes the content. The main reason for the lack of journalists' involvement in looking for data is their inability to search for data in another language. There are several problems in relation to this model: firstly, it minimises the role of journalists in the data journalism production. Secondly, data analysts don't usually have any journalistic skills that help them select the appropriate angle of the story, this is coupled with their inability to determine which data is capable of being turned into a news story.

5.3.2. Data Analyst/Designer Driven Content (Shabiba)

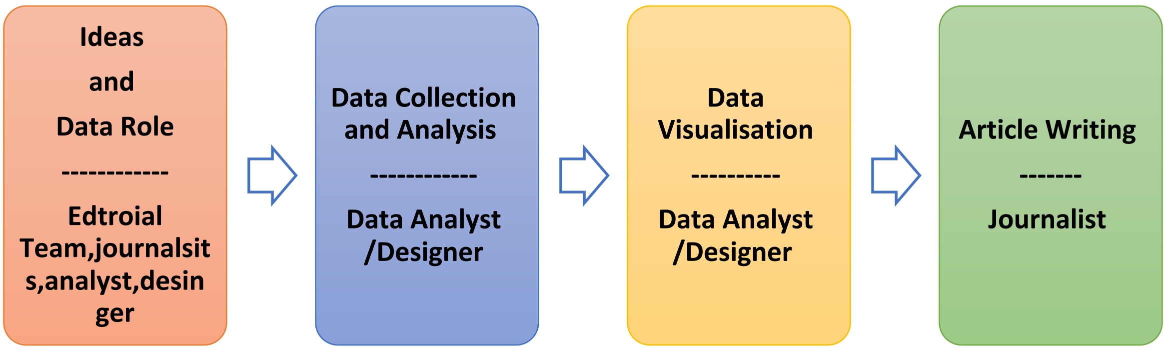


Figure 5. Shabiba taxonomy.

The data journalism content in the Shabiba newspaper starts with an idea of the news story; this usually emerges following an editorial meeting involving the data analyst/designer and journalist. After the idea has been recommended, the editorial deck will consult the newspaper's data analyst and designer about the viability of the idea in becoming data journalism content. Then when the data analyst and designer approve the idea, they will start collecting the data for the story, either by communicating with the correspondents or by looking for data from different sources, such as governmental databases. This process applies for the simple daily data content, with regards to bigger, more complex data content, the data analyst and designer usually have an events diary to plan for future events that require complex data content, such as the World Cup. In some cases, the data analyst and designer start and complete the data journalism content from scratch by themselves; in the whole newspaper there are only two data analysts and designers who have the ability to perform these tasks. After the emergence of the idea, collecting the data and analysing it, the data analyst and the designer start designing data content. The design usually begins with some sketching for several potential data visualisation styles to determine which one is the most appropriate for the content. Also, the sketching helps the designer organise his thoughts and allows him to seek other's opinion about the content. In addition, it enables him to assign the work another designer while keeping to the main idea of the design. Next, when the design is completed, it will be assigned to a journalist who will write an introduction for the content and then it will be ready to publish. Despite that the fact that the data analyst and the designer are the key contributors to the production of data journalism in the Shabiba newspaper, there are some exceptions where a journalist will have an idea and collect its data, then will hand it over to the design team so they can conduct the data visualisation.

This taxonomy seems affective in terms of the quality of the content, but it in fact had several issues. Firstly, a common issue for the Shabiba and Makkah newspapers is the lack of involvement of the journalists in the data production process, this is something that may bring into question the journalistic role in data journalism workflow. The lack of involvement might be caused by several reasons such as the lack of journalists' understanding and knowledge of data journalism and how it is being practised. For example, journalists in the Shabiba do not have the ability to determine the end product of data journalism content, due to their lack of design knowledge. Also, they lack the skills to enable them to collect the suitable data for the news stories, or they are so occupied with their regular duties and this prevents them from seeking extra work, such as collecting data. Secondly, the data analyst and the designer are under extreme pressure as they are responsible for their own designated work as well as the work of others. These additional tasks may include collecting and analysing the data; this lead one of the interviewees to claim that the workflow of data journalism in their newspaper lacks the teamwork spirit, as he is the only one who work on such content. He stated:

"To be honest I am the only person who works in the data journalism content... the newspaper viewed data journalism as complementary part of their routine." (DJ4)

Most of this extra work goes unnoticed as one of interviewee describe it, since they do not have their by-line on the content and their extra work is unpaid.

5.3.3. Journalist Driven Content (Alroeya)

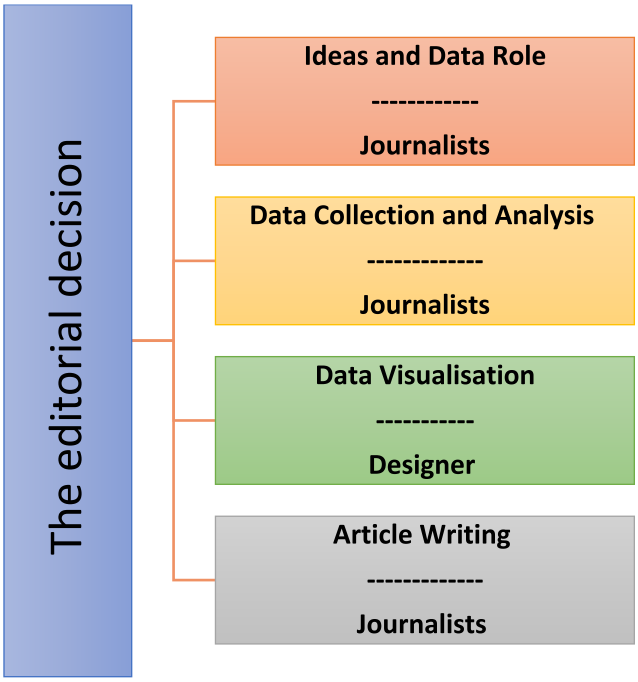


Figure 6. Alroeya taxonomy.

The workflow/ taxonomy of Alroeya is mostly driven by journalists, where they generate the idea, start collecting its data and then analyse it. The process of the generating the idea starts with skimming the news circle to find a potential data story or by following Western news organisations to find suitable content to translate or imitate. This process, as one of Alroeya's journalist (DJ5) describes it, is more about analysing the news rather than collecting data, this is because they try to turn any news story into data journalism content rather than dig deeper for data to collect and then analyse it. After the text of the news story is ready, it will be assigned to a designer who is responsible for visualising the data; usually the designer has complete control in terms of styles or shape on the visualisation of the content. However, this step imposes a challenge for designers since they are required to understand the news story to find an appropriate way to visualise it, all of this is also done without any guidance from the journalist who actually wrote the story. This step has caused a dilemma in Alroeya newsroom, designers have begun complaining that the text at times lacks any numerical data, making it harder to visualise. Also, sometimes the designers misunderstand the intended idea of the story and misrepresent it through their design.

Despite the fact that data journalism production at Alroeya has a journalist-based workflow, they still face some issues. Firstly, the lack of communication between the journalists and designers makes some steps of this workflow harder for designers. One of the designers (D8) describes the lack of communication, plus the routine in newsroom as machine work as you do not have the ability to refuse any orders; this made him feel untrusted by the senior level personnel in the newsroom.

"They just give orders, you to have to execute them without questioning, while in my previous job at another newspaper we had a constant dialogue with the editor, and they listen to us."

(D8)

In relation to the routine in the newsroom, several interviewees highlight that there were some issues when it came to getting an approval for the news story. They state that it comes in the latter stages of the production process and this is usually after the piece is ready to publish. The interviewees suggest that the editor should investigate the story while it is under development and not when it is ready to publish, for example the editor should take the time to look at the story before the data visualisation and not merely before publishing. These issues could be attributed to the lack of communication in the newsrooms, which in turn causes a waste of time and effort for workers. Also, the interviewee highlights that any good data journalism team requires a solid information centre within the newsroom, since it will save the journalists time when they are looking for data. He goes further to claim that a good information centre will eventuality eliminate the journalists' role in the data journalism team due to their ability to collect and analyse data themselves.

5.3.4. External Content/ Internal Content (Alwatan)

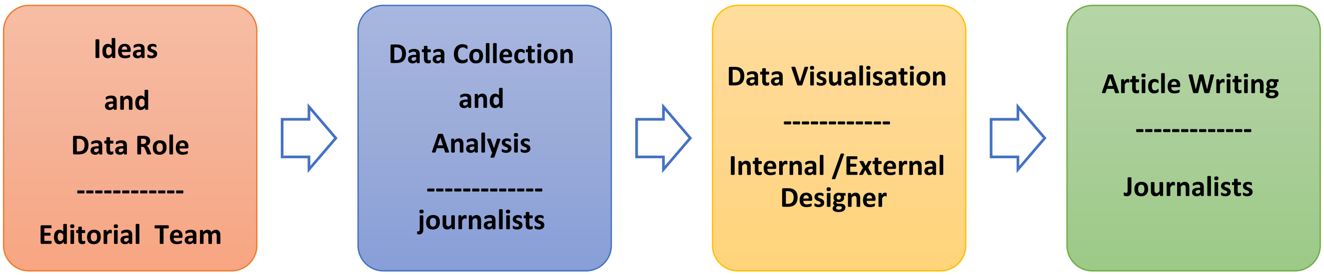


Figure 7. Alwatan taxonomy.

The workflow of data journalism production in Alwatan newspaper is divided into two parts. The first part is the internal production, and this usually involves producing simple data content. The second part is the external production and is assigned to a third-party company so that they can produce more complex data journalism content for the newspaper. Internal production generally starts with an idea generated from the department leader, such as the economic or political department. These leaders choose to utilise data as a mean to highlight a certain news story. In some cases, the editorial team will suggest ideas for data journalism content and will assign it to one of the newspaper departments to work on it. After the idea has been agreed, a journalist will start collecting and analysing the data, once this is done, it will be sent to the managing editor for approval. After the content is approved by the managing editor, it will be assigned to a designer to visualise the data, in some cases the journalist will give the designer a general idea about how he would like the data to be visualised, but the designer has the ultimate decision for selecting the appropriate visualisation.

"If the journalist has a vision about the visualization, he can share it with me, but usually I do not have time to execute his vision since I have a deadline that I need to meet." (D6)

The above process only applies for data journalism content that been produced internally, which usually only contains simple daily content. Although the externally produced content follows the same steps, there is an exception which is when the journalist submits the content to the managing editor for approval, he or other senior level workers in the editorial team will send it to a third party in order to get the data visualised. The communication with the third-party company is exclusive to the senior level workers in the editorial team. Journalists not allowed to communicate with them, even if they want to give them their vision about the news piece or to correct any mistakes.

The newsroom employees of Alwatan newspaper seem satisfied with how data journalism is being produced, since it has a clear structure which saves time and effort. However, there is a fundamental issue in this workflow, which is the reliance on external partners to produce some of their content. According to the editor (SR3), they adopted this step in a bid to reduce the cost of data journalism production, and to overcome the shortage of qualified staff who are able the produce such content.

''I had to improvise and think out of the box to have data journalism contents, while spending within its allocated budget''(SR3)

All of these points are reasonable justifications for adopting this model, however they do not make up for the problems caused by the lack of communication between the journalists and the third-party designers. This lack of communication forces journalists to have their pieces detailed as much as possible in order to make it easier for the designer to understand, so they can produce it without any issues or setbacks. Furthermore, journalists not having contact with the third-party causes time wasting and waste of effort if there are any issues with content. This is because the third party is only allowed to contact senior level editorial team staff and not the journalists directly.

In conclusion, all these taxonomies/workflows do not display any types of advanced skills in terms of handling data, they also lack the ability to distinguish between the role of the team as a whole or an individual team member in the data journalism production process. Therefore, it is evident that the do-it-yourself approach is the dominating approach in data journalism practises in the studied newsrooms. This indicates a lack of a well-established structure in the newsrooms for such content, such as not having a data journalism team. The absence of a data journalism team/department may be because there is no specific job description for those who are working on data journalism content (Bekhit, 2009); this in turn enables newsrooms to assign workers any task they deem fit.

In evaluation context, it is clear that there is an enormous different between data journalism practices in the GCC's newsrooms and in Western newsrooms. Also, it is unjust comparison between the GCC context and the Western context in so many levels, which include the limitations, factors on influences. One of the main differences between the GCC and the West is the mindset of journalists; Western journalists have a long tradition of quantitative-oriented practices, a tradition which dates back to the invention of CAR (Splendore 2016). This is unlike the rest of the world, especially the journalists working in the GCC, were journalists lack the skills of being quantitative-oriented reporters. They have not benefited from the upturn of quantitative practices in journalism, this is not only the case for the GCC's journalists, but this is also applicable to journalists from developed countries such as China (Zhang and Feng 2018). Moreover, in the GCC there seems to be a tendency of avoiding controversial topics and thus they fish for data to meet their needs. For instance, interviewee DJ4 stated that he likes to have a positive overview rather than focus on negatives. In contrast, data journalists in the USA said "Purposely sought data that was hard to get. One reason was that hard-to-get data tended to be more controversial" (Fink and Anderson 2014, P.7), and they usually seek data that sources for whatever reason are reluctant to release. This tendency does not appear from out of nowhere, but it has its roots in the journalism practices in the Arab context. Rugh (2004) argued that investigative reporting is uncommon in loyalist countries, likewise Amin (2002) claimed that Arab journalist avoided hard news reporting in order to avoid any dispute with the government. The difference in staff is another limitation that data journalism in the GCC has when compared to journalism in the Western context. Despite having a similar approach to Western practices, there are obvious differences between how staff operate in these two contexts. For instance, data journalism teams in Western newsrooms usually contain data journalists, developers, and designers (Appelgren and Nygren 2014; Dick 2014), whereas the data journalism teams in the GCC, if there actually is one, usually includes a data analyst, designer and a data journalist or a regular journalist. In addition to this, the source of information is another difference between data journalism in the GCC and the West, for instance Knight (2015) and Tandoc and Oh (2015) found that in the West, the government and its agencies were the most used source of information for data journalism content. In contrast, in the GCC newsrooms I studied, news agencies and websites were the most used source of information for data journalism content.

In terms of influences factors, two influential factors stand out, these are the governmental impact and the economic impact. As described in chapter two of this research, governments in the GCC play a great role in influencing the content of journalism, this is done by imposing restrictions through different means, such as laws and regulations. While the influence of economic factors is evident through the differences in the media business model adopted in the GCC and the West. For instance, in the West, the business model sees data journalism as an important factor that impacts reader engagement, using this information Western news outlets will focus on improving this type of content (Mutsvairo et al. 2020). On the other hand, the GCC's media business model tends to rely on the government as a main source of income, and they do not rely on the quality of the content to sustain revenue streams as they know that the government will still fund them regardless of the quality of their content (Fahmy and Attia 2020). This business model has caused a negative impact on the state of data journalism in the Arab world, this is evident in the absence of a vibrant and adaptable news organisation in the region (Fahmy and Attia 2020).

Furthermore, as any emerging concept, data journalism has faced some conceptual and fundamental issues. These issues are either in its definition in relation to other journalistic practices or due to its role in newsrooms. Wright and Doyle (2018) argued that it is important to have a specific definition of data journalism in order to set professional boundaries and for the concept to gain its own identity. Furthermore, having a specific definition may lead to enhancing its legitimacy internally and externally (Wright and Doyle 2018). Scholars define data journalism, in its current form, as the utilisation of data to tell a story, they distinguish data journalism as a workflow rather than a technique, such as CAR (Gray, Bounegru and Chambers 2012). Mirko Lorenz viewed data journalism as a workflow that goes deeper than using computers to search datasets; rather, it involves more skills such as analysing, visualisation and storytelling (Lorenz 2010).

5.4. Issues and challenges

This section will address the issues and challenges that data journalism faces in terms of production and content. It will also identify the impact of the government, the economy, and the institution on data journalism practises. Furthermore, it will investigate how newsrooms deal with these issues and challenges, while classifying the challenges into two types of challenges: challenges unique to GCC newsrooms and common challenges for data journalism across the globe.

After analysing the collected data from the interviews, there were five types of challenges that I come across: challenges regarding the journalistic role and newsrooms workflow, challenges regarding data and its access, institutional challenges, challenges caused by governmental impact on newspapers and lastly challenges caused by economic pressure.

5.4.1. Challenges regarding journalistic role and newsroom workflow

5.4.1.1 Journalistic role

The challenges regarding the journalistic role and newsroom workflow will investigate the issues and challenges that affect journalists professionally and it will also look into the production of data journalism. Altering the journalistic role in the production of data journalism is one of the main issues of data journalism practises in GCC newsrooms. As mentioned in the data journalism taxonomies, there is a clear indication of minimising the role of journalists in the process of data journalism production. One of the interviewees (DJ5) argued there are two reasons behind this regression of the journalist's role in newsrooms: first, the information centres in newsrooms have the ability to collect and analyse the required data, then send it to the designer to visualise. The traditional journalists are unable to perform these tasks. Therefore, the newsrooms only need a data analyst and designer to produce data journalism content, the role of journalists will be only to write a text about the content if required. Second, in the social media era news sources such as the government tend to publish their news stories via their social media platforms, this in turn eliminates the role for a middleman which was occupied by journalists as link between the people and the news source. This interviewee states:

"The government eliminated the role of correspondents; he was the middleman which was a link between people and news sources such as government agencies. They have their own team who produce their content and publish it in their social media accounts." (DJ5)

The reliance of news sources to publish their news stories in their own way has caused a lack of content for newspapers to publish. In this era of social media, the sources of data such as the government and individual people have begun taking their problems and stories directly to social media, rather than taking it to the newspapers. The regression of the journalist's role in data journalism production has not taken place overnight, several data journalism studies have in fact mentioned that journalist need to be able to work with data in order to stay competitive or they risk the prospect of their roles becoming redundant (Veglis and Bratsas 2017). Furthermore, several Western news organisations have hired programmers to work on their data journalism content (Parasie and Dagiral 2012), it is also evident in the shift in hiring policies that news organisations have set out with priority now on applicants with data and visualisation skills (Engebretsen et al. 2018). Arab data journalists describe data journalism as the future of journalism practises, and the ability of working with data competently is now seen as a necessity for journalists to keep their job (Lewis and Nashmi 2019). Moreover, Stalph and Borges-Rey argued that in the near future, data journalism as a skillset will be considered a basic and essential requirement for every professional journalist and will be taught in journalism education courses (Stalph and Borges-Rey 2018).

5.4.1.2 Workload

Workload also is other challenges that affects data journalism production in GCC newsrooms. This is primarily because members of the data journalism team have several tasks to simultaneously work on in their daily work schedule. Several interviewees mentioned that they prefer to work on one piece at time, but this is not the case since they are sometimes required to work on multiple pieces at the same time. The workload has a fundamental impact on the quality of the content, for example a data analyst (DJ1) said that she will collect the data from around 50 sources, if she has only one piece due, while she will only collect data from one or two sources if she has several pieces to work on.

"There is a correlation between the volume of the work and its quality, if I have 2 design per day the quality will be different if I have 10 per day, not only me but any designer as well."

(D7)

In addition to the quality of the content suffering, the heavy workload also hinders data journalism workers from improving their skills and knowledge, an interviewee (J5) argued that it is difficult combine training and their working hours because of the lack of free time.

The production of data journalism has two approaches as described in data journalism research: a) to have a responsible team that produces such content, b) individual personnel who try to do most or all the work of the data journalism content (Wright and Doyle 2018). The second approach is the common approach in the GCC's newsrooms; however, the adoption of this approach has caused extra workload for some of the newsrooms' workers. There are also some challenges regarding the structure of the newsroom itself. For instance, there are no designated departments to produce such content. Bekhit (2009) attributes the lack of infographics produced by Emirati newspapers to the absence of specialised departments and teams assigned to produce it. Furthermore, there is no clear policy regarding the production of such content, leaving journalists unable to maximise the utilisation of data in their stories (Bekhit, 2009).

5.4.1.3 Time

Data journalism production is seen as a time-consuming process, several interviewees indicate time as one of the main challenges that affects data journalism in the GCC's newsrooms. Based on the data analysis of the interviews, there are two types of data journalism content and producing each one requires a different amount of time. Interviewees describe the content of data journalism as either simple content which is based on comparing two to three variables, and complicated content which is based on analysing different datasets. The time required to produce simple content varies between as much as 5 hours to as few as 10 minutes. Simple content includes non-exclusive news such as press releases, due to this non-exclusivity, the data requires rapid production since other newspapers also have access and may publish it first. On the other hand, complicated content requires more time to produce with the amount of time varying between weeks or months. This is because complicated content is associated with big event, such as the Hajj or the World Cup, so the newspapers have a pre-scheduled plan for using this type of content. The tight nature of deadlines and time it takes to produce data journalism content have a great impact on the quality of the content, especially for daily newspapers. Therefore, newspapers tend to produce soft news content in order to ensure their continuity in publishing data journalism content. They choose to do this because soft news content can be produced in a shorter time and has a long-life cycle. The tight deadlines and time pressure have also caused several data journalism projects to remain unfinished because data team either missed the deadline or encountered an issue with the production process, which did not allow them to continue working on the content. The insufficient time given to produce data journalism content is considered one of the main challenges that data journalism faces globally, serval data journalism studies refer to the lack of time as a force that drives journalists to select data stories that require less time to produce (Fink and Anderson 2014).

5.4.1.4 Content prioritisation

The level of priority given to data journalism in the newspapers' content is likewise a great challenge that data journalism faces in the GCC's newsrooms. This issue is related to how much importance newspapers give to data journalism content. Two interviewees, who are responsible for the layout of pages in newspapers, said that data journalism is the most likely content to be sacrificed and replaced by advertisement content. In addition to this, an interviewee (DJ4) sees data journalism content in their newspaper as supplementary content, rather than essential content. This belief is due to several reasons, such as the lack of dedicated staff to work on data journalism and the lack of allocated fund to improve the data journalism team.

5.4.1.5 Data journalism practice

Throughout the course of this research, it has become obvious that newspapers are reluctant to establish an ideal set of data journalism practises in their newsrooms. This reluctance can be attributed to two main obstacles: resistance to change and fear of failure.

"I cannot take the data journalism practises to the next level until I have the right team and personal to do so, we are still in 101 of data journalism, in order to move to 201, we need to

have a better infrastructure in terms of personal and tools. However, due to the economic pressure we are unable to improve our team and tools, we may be a bit late, but we need to ensure that our improvement comes with a product that we are satisfied with, and that we start from where the others ended." (SR1)

"Practitioners of data journalism are expensive so in order to have a complete product it will cost you a lot, I made a proposal to the management of the newspaper to establish data journalism team which was refuse to due to its cost. So, I am working in a new way to produce data journalism within the newspapers budget, and it ensure the quality of content…. The new way is based on outsourced content of data journalism." (SR3)

Arab data journalists mentioned that due to their lack of data skills, journalists tend to prefer familiar and traditional journalistic methods, such as interviews and observations instead of relying on technology to produce their stories (Lewis and Nashmi 2019). Moreover, there are a lack of qualified journalists who work competently with data; data journalists should be data literate and have a basic understanding of programming (Zander and Mosterman 2013). These skillsets enable journalists to interpret data and discover any patterns within them.

5.4.2. Challenges regarding data and its access

This section will examine the issues and challenges that affect journalists when acquiring the required data. Access to data is another key problem that that data journalism faces in GCC newsrooms, although this is problem not unique to this region as it is a common challenge for everyone practising data journalism. The access to data encompasses several elements: getting the data, which focuses on where and how the data is found, the time required to get the data, which refers to the time spent finding and collecting data, the accuracy of the data, which focuses on the trustworthiness of the data, and finally the issues that affect the data, such as the language and format. Getting the data is considered one of the most difficult steps in the access process, interviewees complain about how hard it is to find simple data such as the prices of gold. This is because either the responsible department do not publish them, or they are reluctant to give it to the journalists. To add to this problem, sometimes journalists find outdated or unreliable data about the topic they are searching for and they are then forced to spend more time finding the appropriate data. The knock-on effect of this is that the data journalism team may fail to meet their deadlines as acquiring the data took too long. Interviewee DJ5 highlighted that there is a crisis of confidence between journalists and news sources, which is caused by the news sources who fail to share key information or data to journalists since they neither care about journalism nor the workers requesting the data.

"Getting the governmental data, it is not a straightforward process, despite government publishing some of its the data which usually too general or outdated. If you want a specific data you need to contact the responsible agency directly in order to obtain it, for instance, I want data about the trade exchange between Bahrain and Kuwait, I have to contact the Chamber of Commerce to get the data." (J5)

Moreover, interviewee J2 describes the accuracy of data as a paramount step in the production of data journalism, since having inaccurate data could lead to a great amount of confusion among the readers. Therefore, journalists need to be extra careful about data and its sources, so that they can avoid any misleading information and that they do not undermine the credibility of the newspaper. Another challenge was cited by interviewee DJ1 who highlighted that the lack of data in the Arabic language was an obstacle for them because most of data journalism team members were unable to understand any other language besides Arabic. This interviewee went on to mention that there is a lack of data regarding GCC countries in Western databases, and this causes an issue if the story has an angle to it that talks about one of these countries. In addition to this, the format of the datasets has an impact on data journalism production in GCC newsrooms, in some cases the data is available, but in formats that make it harder to analyse and extract, such as PDF files. The access to data is in fact a common issue that data journalism faces globally, and despite the fact that we are living in an open-data era, data is still not completely open or accessible. A lot of data still requires the Freedom of Information Act to obtain as governments resist releasing certain data. Even if the data is publicly available, it is still may not be usable because the format of the data may require a great amount of effort to make it useable (Aitamurto, Sirkkunen and Lehtonen 2011). Moreover, the GCC countries lack laws such as the Freedom of Information Act, which makes it easier for journalists to acquire the required data. Jordan is in fact the only country in the Middle East to have a law that allows information access (Young 2014; Anon. 2017). Another challenge that data journalism practises have faced is the accuracy of data; in some cases, datasets have some errors or have been manipulated by the source. Therefore, data journalists should be able to discover any issues with the data, as inaccurate data could undermine the trustworthiness of the newspaper (Aitamurto, Sirkkunen and Lehtonen 2011).

Despite these issues regarding the access to data, a senior level interviewee (SR1) argued that the government has taken several steps in the right direction to drive the private and public sectors to become more open about their data. However, they still provide more general data which hinders journalists from presenting accurate content.

"We want them to be more specific in their data, for example we want them to categorise their data by the region and city. These small details help us to provide better content." (SR1)

5.4.3. Institutional challenges

Institutional challenges also impact data journalism in the GCC countries, these challenges are related to the data journalism team, if there is one, and the data journalism content. There are several institutional challenges, these include censorship, inflexibility in working practises and a lack of qualified and well-trained personnel.

5.4.3.1 Censorship

Censorship policies in newspapers set by the senior team prevent journalists from publishing stories or even working on certain stories. Interviewee DJ5 states that some of the editorial team has become a means of over censorship, he cited a case when the editorial team banned him from publishing a story even though it had been published in the national news agency. Another interviewee (DJ1) mentioned that she has to seek the green light from the editorial team before conducting any stories to avoid any restrictions in later stages of the production process. The strict editorial censorship, which in some cases it stricter than government-imposed censorship, originates from the editorial team's own fear of losing their positions should anything incriminating be published and so that they can protecting themselves from reprisals (Al Shebeili 2000).

5.4.3.2 Inflexibility

Interviewees refer to the inflexibility of editorial team as a major institutional challenge they face when working on data journalism content. Interviewee DJ4 sees that due to the inflexibility in the organisation, the creativity of data journalism teams is minimised. According to this interviewee, this inflexibility stems from the editorial team who journalists by making them work within a set format. Another interviewee

(D6) argues that the editorial team's lack of initiative has caused a neglect of the importance of data journalism as an emerging style of journalism, which in turn has affected its development in the newsroom.

"We were compelled to adapt new styles such as data journalism, unlike the Western who adapt it as they were pioneer. Therefore, we lost the precedency which caused the lack of qualified people and the lack of understanding, that lead to a knowledge gap that we are trying keep up with." (D6)

In addition to this, inflexibility shown by the editorial team has prevented journalists from allocating the appropriate time to either work on data journalism stories or to get more training on data journalism production.

"It is impossible to spare a journalist to work on data journalism content for an extended period, I can give him a day and the rest of the team and I will cover for him. But I cannot give him a week and we keep covering his workload, I am in middle I have bosses that give me orders and team that expect me to treat them fairly." (J5)

Despite the criticisms outlined above, senior level interviewees (SR1) cited the following in defence of the editorial team's inflexibility; although newspapers encourage creativity, the editorial team has the responsibility of maintain the identity of the newspaper, so any content needs to be compatible with newspaper's style/type. In terms of lacking initiative, this interviewee argues that in order to provide a top-quality content, you need to have the appropriate infrastructure in place, such as tools and dedicated teams. Another senior level interviewee (SR3) claimed that it is difficult to allocate more time to work on data journalism stories or training, since he is required to have a fair balance between all of his employees and not devote too much time to one type of content (data journalism). However, another senior level employee (SR1) disagrees with this stance, stating his newspaper has allocated journalists enough time so that they can work on their data journalism content.

5.4.3.3 Lack of personnel

The lack of personnel is considered an institutional challenge that data journalism production faces in GCC newsrooms. Several interviewees attributed the increase in workload and the time it takes to produce data journalism content to the lack of personnel, since there are only a few workers who are qualified and skilled enough to produce this kind of content. The lack of staff is here does not mean that there is an insufficient amount of people who work in the newsroom, but it refers to the lack of qualified people who are able to competently work with data journalism. An interviewee argued (D3) that their newspaper has several designers, but only a few were able to produce data visualisation content. They said this was because these designers were trained to design a newspaper layout but not how to design data visualisation content. Another interviewee (D2) attributes the lack of qualified staff, especially designers, to the shortage of courses and educational institutes that provide suitable training to people working on data visualisation. This interviewee stated that he had interviewed numerous designers, but most of them merely had rudimentary skills when it came to designing data visualisation. Likewise, participant DJ4 mentioned that the lack of qualified personnel in newsrooms causes an imbalance in terms of task distribution because the qualified staff are asked to take on extra tasks in order to cover for less qualified people. Due to the lack of qualified staff, data analysts in the newspapers have the final say when it comes to selecting the data and its sources, interviewee DJ1 describes this superiority as a result of her ability to find data also her understanding of what kind of data works.

A senior level interviewee (SR1) argued that it is difficult to find a qualified person who has the suitable skillsets to work in data journalism production, they felt this was due to their scarcity and the fierce competition between newspapers to hire them. Moreover, he assigned the lack of qualified staff in the newsroom to the fact that newsrooms want to preserve the stability of their teams. So, since the qualified personal are in high demand, newspapers fear losing them at any time and this fear may even stop them from hiring qualified staff in the first place. He added that his newspaper invested in training and certifying its employees, but they have no control over job retention and cannot force the team to stay intact. When it comes to opportunities for training, the interviewees stated that they had benefited from the training courses that were available to them, with most of the courses being internally organised. However, they complained that these training sessions were not held on a regular basis, either because it was hard to fit it with their workload or the workers were not requesting them. As a result, a senior level interviewee (SR1) argued that on-the-job training was more effective for the newspaper's staff since it allowed them to improve the whole team and it led to a smoother transition if the team happened to lose one of its members. In spite of these institutional issues, some interviewees claimed that the institution they worked in has had a positive impact on their work. For instance, participant J6 said that the management of the newspaper approved his request for tools that helped him with his tasks, such as access to private databases. Another interviewee (J3) mentioned that the management team in his newspaper always encourage them to perform creatively and they have a forward-thinking vision of how to utilise data journalism content in the newspaper.

Fink and Anderson (2014) found that the lack of personnel, tools and time are the main challenges facing data journalism practices in the newsrooms. The lack of skilled personnel with the ability to deal with data in newsrooms is seen as a major challenge to data journalism. This issue stems from the facts that newsrooms are forced to hire under-qualified staff because the pool of applicants who apply is so poor, alongside this is the impact of the global economic downturn, which has led to newsrooms cutting back on their hiring (Fink and Anderson 2014).

Moreover, data journalists, especially those working in small organisations, have limited access to specialist tools and software that enable them to produce data journalism. Consequently, many newsrooms are forced to depend on a third party to produce such content, or they work with deficient tools and software (Fink and Anderson 2014). When newsrooms work with deficient tools and software, they actually do not do data journalism any justice as the quality of the content suffers tremendously (Fink and Anderson 2014).

Furthermore, data journalists tend to choose data that takes the minimum amount of time to clean and validate, they do this because this type of data requires less time to produce the finished content (Fink and Anderson 2014). The disputes between the operational side (editors-in-chief) and the commercial side of newspapers is well documented in journalism research. When these two sides clash, there a severe negative impact on the practises of newsrooms, for example, time-consuming content such as data journalism comes under great scrutiny to check if it is actually worth the resources it requires to produce (McManus 1994). In contrast to this is the case of Swedish newsrooms, where both the commercial and operational side of the newspapers work together to dedicate resources to help bolster their newsrooms' knowledge and skills in data journalism (Appelgren and Nygren 2014).

5.4.4. Governmental challenges

The impact of the government is another issue data journalism production faces in newsrooms around the GCC. These governmental challenges refer to three elements: government competition, freedom of information and freedom of press.

5.4.4.1 Government competition

This section will examine how governments compete with newspapers, either by dismissing the role of journalism in their society as a means to deliver the news, or by recruiting journalists themselves. Interviewee DJ5 argued that in this era of social media, governments tend to publish their own stories and press-releases via their social media platforms. This interviewee added the government is attempting to establish one-way communication with the people while trying to take over and diminish the role of the journalism industry. This interviewee felt that as a consequence of these governmental actions, the journalism industry as a whole suffers. DJ5 went as far as describing these actions as unprofessional, since they can be classed as self-promoting and thus undermine the people's trust in the government. In a similar manner, participant SR2 argued that the government has been influenced by the attractive nature of data journalism, and thus they have been publishing a lot of data journalism content themselves, rather than leaving it to the professionals. In some cases, government departments broadcast its news through means of data visualisation, such as infographics with their logo or watermark on it. However, doing this minimises the newspaper's ability to edit the content in case they want to reuse it.

As governments in the GCC have increasingly begun to publish their own data journalism content, they have seen the need to recruit their own qualified and skilled data journalists to work on the content. This has led to them actually compete with newspapers for attracting and hiring top journalists who can competently work with data. This strategy adopted by GCC governments imposes a challenge for newspapers as they face a struggle to keep their top staff from leaving, and when trying to hire new staff as usually they cannot compete with the staff incentives offered by the government. A senior level interviewee (SR1) said that the government departments lure data journalists to abandon their journalism jobs and work for them. SR1 felt that this was unwise because data journalism content requires a whole team to produce and not only a journalist. So, a journalist who leaves to work for the government will struggle as he/she will not have much support around them and may be left to their own devices.

5.4.4.2 Freedom of information and freedom of press

Although GCC governments have at times taken publishing the news into their own hands as described above, their (lack of) laws and regulations severely hinder the ability of data journalism teams in news organisations to access the data they require to publish quality content. This has a negative impact on the production of data journalism in the region because there is a lack of available data. Alongside this problem is the fact that since news organisations cannot access all the data they require; people have become reliant on the government as the main source of news in the region. For instance, interviewee J5 said that in some cases the government provide irrelevant data as it is either outdated or is general information that is unusable for the intended story. Furthermore, according to participant DJ5 when the government publishes a press release, they will not usually accept any follow up inquiries regarding it, and they will ignore all the journalist’s communication attempts without proving a reason.

Other participants (DJ1) complained that sometimes the government authorities responsible for publishing statistics deny access to the questionnaires and surveys the government used to gather specific data, and in some cases the questionnaires and surveys do not exist at all. As a result of these highlighted issues, freedom of the press and censorship can be considered the main boundaries that affect journalistic practices in the GCC (Al Yasin 2014; Duffy 2014). The restricted freedom of the press in the GCC may obstruct the journalists from reporting any wrongdoing or issues in the society. This means that news outlets actually serve as a mobilisation tool, instead of doing their actual role which is to encourage the people in power to be transparent and accountable (Sakr 2003).

As the government is one of the main sources of the news in GCC countries, the independent press has limited freedom to report the news as they wish. A senior level interviewee (SR3) mentioned that it is impossible to separate the freedom of data journalism from the concept of freedom of press in general, since the red lines are almost the same. However, he noted that the margin of the freedom is improving these days. Interviewee SR1 said that it is natural that the state imposes its orientations on the content of its data, however he stressed that each newspaper has the freedom of their own editorial style. Despite the private ownership of newspapers in the GCC countries, the government still imposes indirect controls over their activities and the owners of the newspapers remain loyal to the existing regimes and their ideologies (Mellor 2005).

Having said this, a senior level worker (SR1) claimed that he is convinced that you can publish any information you want when you are able to manoeuvre your way smartly within the defined redlines, he added that the key thing is how to present the information. In addition to this, he mentioned that data journalism content does not attempt to threaten state security, but instead it helps the government to spot any wrongdoing in its performance. Lastly, SR1 said in some cases the state does not order you to do or to do not something, but instead the managerial staff in the newspapers should be able to read between the line and infer the meanings from government sources.

"The ministry of Media does not order you to do or not to do, but as editors-in-chief we are with government official in meetings or trips, and we look into a lot of governmental files. The smart editor-in-chief can read the scene, and act accordingly based on existing circumstances. However, that does not mean that you do not receive orders to not publish certain topics for variety of reasons, sometimes media personals will be briefed about these reasons and sometimes not, based on the level of its confidentiality." (SR1)

In contrast to the statements of SR1, it is actually possible to find out how the strict control on the freedom of press has affected data journalism workers, as it is evident when noticing the rise of self-censorship. For instance, one of the interviewees (DJ4) argued that he does not focus on the insufficiency of the government's performance because he has a positive outlook and he do not like to focus on negatives. He added that some government agencies have given him exclusive access to data that he requires for some of his content:

"They give me some data that we are not given to anybody else, they say we do not trust any person, but we trust you to do a better job with them." (DJ4)

Moreover, some of the interviewees describe governmental impact as a positive influence on their data journalism practises. They state this in terms of the government providing ready to publish data content, interviewee J4 praised this step proclaiming it saves the time and effort of the newsroom employees. Likewise, several interviewees said that they had not only received positive feedback from officials about their data journalism content, but that also the government departments such as the National Statistics Centre was very supportive and provided any required data.

These issues and challenges affect journalistic practises in GCC newsrooms, and they have forced data journalism workers to look at alternative ways to overcome these problems. For instance, journalists deal with the government restricting access to data in two ways: either by looking for different sources of information or by guessing how the data will evolve based on the limited data they have gained access to. In some cases, newspapers will offer some compromises in order to build a sustainable relationship with governmental sources, and because of these compromises, it becomes easier for them to obtain data they require.

5.4.5. Economic challenges

Economic pressure also contributes to the challenges faced by data journalism practises in GCC newsrooms, causing positive developments in the region's newsrooms to be restricted. A senior level employee (SR1) said that the economic pressure is the primary cause that prevents the newspaper from taking the next step in setting up a code of comprehensive, well-established data journalism practises which covers all aspects of data journalism, such as the content and interactivity. When investigating the economic pressure newspapers in the region face, it can be seen that two elements have the most detrimental effect of the production of data journalism: the inability to access specialist tools and the inability to hire well-qualified personnel. The lack of specialist tools describes the newspaper's inability to provide the appropriate staff with technologies and access to data for its employees, without access to these staff struggle to succeed in the profession. For instance, an interviewee (DJ1) mentioned that due to economic pressures the newspaper had to cancel their subscriptions for several paid databases and news sources, therefore she had to use her friend's university account to get access to some of these databases. This economic pressure has forced newspapers to cut their spending, this is illustrated by participant DJ3 who said that their newspaper had to shut down the newspaper's information centre to minimise operational costs. Another interviewee (D1) highlighted that the economic pressure prevents the newspaper from getting the latest technologies that she desperately needs to carry out her job effectively, this interviewee also mentioned that the newspaper is unable to even update existing technology and software due to financial constraints. The inability to recruit and retain highly qualified personnel is also related to economic pressures. This problem causes the shortage of employees in newsrooms as newsrooms are either forced to let staff go in order to save costs or they do not hire well-qualified staff who command high salaries. This shortage of staff has led some newspapers to close down or merge departments. Interviewee J3 said that their department was cut to half due to economic and financial reasons, and that this has had a negative impact on news production in the organisation. A senior level interviewee (SR3) attributed the difficulty in hiring new employees, especially those capable of conducting data journalism content, due to the high wages they demand, and this leads to news organisations not hiring them as they cannot afford it. Another interviewee (J5) argued that it is difficult to spend more financial resources appointing new staff because of the lack of financial resources and because investing so much in staff will not actually result in increased revenue. In fact, some newspapers have gone a step further and suspended the hiring of new staff indefinitely, and although they may have saved some financial resources, this decision has resulted in the loss of high-calibre applicants who may have had good potential. Interviewee DJ1 said that she had worked with several interns who were skilled and had a lot of potential, but they were unable to hire them since the newspaper had suspended hiring new staff.

The interviewees attributed the economic pressure to the regression of advertisements in newspapers and the associated drop in revenue. They felt that this was because advertisers have become more prone to using other means of advertising, such as social media. Furthermore, they mentioned that consumers have lost their desire to buy newspapers, and thus newspapers are no longer the primary sources of news for a large portion of the GCC's population. Interviewee D2 said that their newspaper was forced to reduce its pages from 36 to 20 in order to minimise the cost, and to counteract the shortage caused by the newspaper's failure to sell the advertising spaces on the pages.

In contrast to the majority of the newspapers who suffered from economic problems, one of the sample newspapers showed financial stability. This caused the employees to praise the organisation for being considerate to their needs, for providing the tools and software they request and for improving the workforce.

Economic pressures impacting data journalism is not something specific to the GCC, but rather it is a challenge that affects newsrooms globally. The consequences of these financial and economic challenges are that newsrooms cannot implement the ideal data journalism practices that they would hope for because they cannot afford to hire well-qualified staff and cannot upgrade their technology or software (De Maeyer et al. 2015). Stalph and Borges-Rey argued that the financial and personnel limitations will eventually be the main reasons for the downturn of data journalism practises in the mainstream media, forcing newsrooms to rely on non-legacy actors to outsource their data handling (Stalph and Borges-Rey 2018). The experience of Alwatan newspaper is a clear evidence of this, as the newspaper already has some of its data journalism content produced externally.

5.5. Conclusion

This chapter presented the research findings, which were based on two phases; the first was based on a quantitative content analysis of five news outlets in the GCC. The second phase was based on a qualitative thematic analysis of semi-structured interviews with the newsroom workers of four newspapers in the GCC.

In the findings of phase one I presented the results of the content analysis. This was based on identifying the characteristics of data journalism content. These characteristics include units, such as types of stories, types of visualisations and source of information. The purpose of this analysis was to determine the current state of data journalism in news outlets based in the GCC, in addition to informing phase two of the research. These findings proved that data journalism practices existed in GCC newsrooms, although the volume of data journalism content varied from each news outlet. Some publish such content on a daily basis while others published content irregularly. The data analysed showed that data visualisation articles were the most used type of stories, while the most covered subject in data journalism content was the world. In terms of data visualisation, maps and infographics were the most used type of data visualisation, while the most-used graphic modes in the sample was stand-alone data visualisation. Governmental sources and websites were the predominant source of information. The data from the examined news outlets also showed there is a reliance on internal production to produce data journalism stories.

Despite the existence of data journalism content in GCC news outlets, this content tended to lack depth and did not appear to be thoroughly detailed. This finding applied to most of the content produced by loyalist media systems, where they tend to avoid controversial topics in order to please the ruling regime. Moreover, the data revealed that journalists in the GCC rely heavily on secondary data, rather than primary data, in their data content. This indicates a tendency of accepting any governmental information as a fact. Even worse in terms of journalistic ethics, some of the newspapers rely on non-trustworthy websites as their source of information, which can harm the credibility of the newspapers and undermine journalists' efforts to produce data journalism content.

Once the findings of phase one were presented, I moved onto explore the findings of the semi-structure interviews with newsrooms workers (phase 2). Phase two aimed to answer research questions 2 and 3, which are related to the conceptualisation of data journalism, the existence of data journalism taxonomies and workflow in the newsrooms studied and the challenges and issues regarding data journalism production in newsrooms in the GCC.

After analysing the data, the research found that there are five main challenges that data journalism practice in the GCC faced, these challenges include challenges in relation to the actual journalistic role and newsroom workflow, challenges regarding data and its access, institutional challenges, challenges caused by governmental impact on newspapers and challenges caused by economic pressure. In addition to this, the research defined four taxonomies of data journalism practice in the GCC, where each taxonomy has its main player who acts as the backbone of the operation. These taxonomies include the data analyst-driven content (Makkah), the data analyst/designer driven content (Shabiba), the journalist-driven content (Alroeya) and the external/internal content (Alwatan).

Despite the existence of data journalism practices in GCC newsrooms, these newsrooms did not display any types of advanced skills in handling the data. The theme of do-it-yourself is thriving in the GCC newsrooms, and in some cases the whole data journalism operation is assigned to one or two of newsrooms' worker. The lack of the legacy of quantitative reporting is one of the main differences between data journalists in the West and data journalists in the GCC. Furthermore, there is a different mindset between journalists in the West and in the GCC, where the Western look for controversial topics while the GCC journalist tend to avoid them. This is a clear example of self-censorship that GCC journalists applied to themselves. This practice originates from a long tradition of imposed government restrictions in the media in the GCC. In addition to this, there is a lack of qualified personnel in GCC newsrooms alongside a lack of a qualified talent pool to recruit from, meaning even if a GCC newsrooms wanted to hire a well-qualified and experienced journalist to work on their data journalism operations, it is extremely difficult to find an applicant that is suitable to work on such content.

6. Conclusion

This research aimed to examine data journalism practice in the GCC, a region which remains almost untouched in terms of data journalism studies. To examine data journalism practices in the GCC, it is important first to evaluate the current situation of data journalism content in the region; this was done through a quantitative content analysis of several news outlets in the region. This analysis provided an indication to the existence of data journalism in the region, despite its rudimentary nature. In addition to this, I examined data journalism practice in the GCC by investigating the newsrooms of four newspapers in the region, all of which were daily newspapers that lacked a proper team of data journalists. The absence of a coordinated effort in producing data journalism can be attributed to two reasons: the lack of personnel and the lack of resources. The do-it-yourself approach thrives in the newsrooms studied, indicating the lack of a well-established structure to produce relevant content.

This research confirmed the existence of data journalism content and practice in the GCC, but this type of journalism is still developing. Most news outlets in the region have not fully incorporated it into their daily news production tasks owing to a lack of personnel, resources and because data journalism is hitherto considered an afterthought. Despite these obstacles, some staff working for the newspapers studied have the desire to advance their data journalism production and improve the quality of the output, but they are faced by the lack of training and inflexibility of their institution.

From the beginning of this project, it was apparent that most data journalism research tended to focus on the Western context. This was not only data journalism studies, but media system theories that classify the Arab media system were also mostly inspired by Western theories. This tendency has led scholars to demand an investigation into data journalism practices outside the realm of Western countries, in order to have a global comparative context of data journalism practises (Fink and Anderson 2014; Stalph and Borges-Rey 2018; Appelgren, Lindén and van Dalen 2019). Also, they encouraged scholars to avoid the Western-centrism approach when examining media system in non-Western countries, which is a common pitfall in current media studies (Wright et al. 2019). Therefore, I opted to study data journalism in the GCC to address this gap in knowledge, and to have a non-Western perspective into data journalism. This is compounded by the fact I am from a GCC country and has worked in and taught journalism in the region and has trained in one of data journalism units in the GCC.

Furthermore, one of the main critiques of the media system theories is its shortcoming to capture new forms of media; this was evident in the absence of novel forms of news production in the media system research, such as data journalism and its role in media system theories. The lack of empirical studies to position data journalism in the media system literature has in turn hindered scholars from providing research mapping the role of data journalism in media systems and newsroom practices on a global comparative scale.

On a wider scale, the findings of this research affirm the existence of data journalism practise beyond the Western context, and these practices deal, in some cases, with the challenges that data journalism in the West deals with. For instance, both practices are challenged by the lack of personnel, tools, time, and difficulties in accessing the required data. Despite dealing with the same challenges, Western media outlets, especially the liberal system from amongst them, benefit from rules and laws that allow them access to the data they require, such as the Freedom of Information Act; this is something lacking in the GCC.

Despite these similarities, data journalism in the West has benefited from Western values, such as freedom of press and information, as well as from advanced courses and training provisions for journalists in data journalism. Moreover, the technological advancement in Western newsrooms has given them an edge over any other competitor. Not only in the technological aspect but also in the establishment of data journalism units/teams within newsrooms. This allows them to allocate the proper resources to produce data content, in turn aiding the process of hiring qualified personnel. In addition, the existence of an investigative team within Western newsrooms had eased the integration of data journalism into newsrooms, a step that the GCC newsrooms usually lack. Moreover, the dynamics of journalism practice in the GCC remain underdeveloped, even when compared to small-sized newsrooms in the West. Unlike in the GCC small-sized newsrooms in the West have the leverage of freedom of press and information. As well this, they have more access to well-qualified personnel who can work on data journalism projects such full-time employees and freelancers. Having access to an abundance of well-qualified workers is rare in GCC newsrooms since the data-savvy people in the region prefer to work in other places as opposed to the journalism industry. Further compounding this issue is the fact that newly graduated journalists in the GCC lack the proper education and in-depth knowledge of data journalism due to their media schools lack of focus on this area of journalism. Despite this, there are some positive signs that newsrooms in the GCC could soon take the next step to integrate data practice in their workflow, for instance the GCC governments have realised and begun to show the importance of data in many aspects of their work including media. GCC governments have started to make a lot of data publicly available, whilst launching several initiatives to encourage people to work on data projects. For example, the Ministry of Media in Saudi Arabia conducted a

"Datathon" in 2018 this the aim of analysing media big data. Likewise, several data communities have come into fruition in the country with the goal of familiarising people to the concept of data.

While these are positive developments, the question that remains is: does the development of data journalism in the GCC follow a similar path to their Western counterparts, who began by developing the field of data journalism slowly over time followed by a period of rapid development? Or do the aforementioned challenges prevent the GCC countries from doing the same. I believe that there is a growing interest in data and data journalism in Saudi journalism communities, but they face strong resistance from traditionalists who either own or run the newspapers. It is evident that the four newspapers in Saudi, where data journalism exist regularly, are either run by the new generation of journalists or the paper itself has been established recently. Likewise, I feel governmental competition in publishing their data stories in their own platforms will force newspapers to adjust in order to stay relevant. However, the lack of financial resources could be a contributor to slowing the pace of development or in fact prevent it; this is a common challenge that faces data journalism even outside of the GCC.

This research aims to examine data journalism practices in the GCC. In order to achieve this goal, I reviewed the existing literature related to media systems and its theories. I adopted a macro to micro approach to determine how the media system in the GCC position themselves in the existing typology of media system theories. The loyalist press typology by Rugh (2004) was the appropriate description of the GCC media system, according to Rugh (2004) the loyalist press is where the government use means such as regulation and financial support to ensure the media are loyal to the ruling regime. Also, I provided a brief history into the GCC and media development in the region, this was done to better understand how the course of history has shaped the current media practise in the region.

Whilst discussing the history and development of data journalism, I focused on other practises that shaped the current form of data journalism, such as CAR and CJ. Furthermore, I drew attention to the issues regarding data journalism's epistemology and how the vagueness of data journalism terminology may have impacted its practise. Next, the elements of data journalism, such as its forms and approaches, as well as the contributory factors that led to its popularity in the globe were explored. After this, the challenges that face data journalism practice globally, and how these may affect its implementation and success were examined. Also, I discussed data journalism in the GCC, while highlighting the issues that scholars face when attempting to examine data journalism outside the Western context.

When attempting to investigate the above, I utilised the hierarchy of influence presented by Shoemaker and Reese (2014) as a framework to explain the factors that impact journalism in the GCC. These factors include political impact, economic impact, organisational impact and professional impact.

The findings of this research describe the current state of data journalism in the GCC and highlight the characteristics are evident in data journalism content in this region. It also provided an in-depth description of the concept of data journalism from the perspective of the GCC's journalists. As well as this, I identified existing data journalism taxonomies and workflow, then detailed each step that newsrooms took to produce data journalism content. Next, this study investigated the issues and challenges that newsroom workers encounter when working on a data journalism project, and how these issues affect them and the content they produce.

The final chapter will present my contribution to knowledge by answering the research questions, as well as outlining the main research findings that aimed to answer the research questions. Furthermore, this chapter will introduce my contribution to data journalism practise; this is based on a proposed model of data journalism practice in the GCC that considers the capability of the newsrooms in the GCC. Finally, this chapter conclude by discussing the research limitations and recommendations for future research.

6.1. Contribution to knowledge

6.1.1. Research Question one

What are the characterises of data journalism contents in the Gulf Cooperation Council (GCC) states of Saudi Arabia, United Arab Emiratis, Oman, and Bahrain?

To answer this question, I conducted quantitative content analysis of several news outlets in the GCC. This content analysis aimed to provide a contextual background surrounding the current reality of data journalism in the GCC, as well as, to inform the second phase of the research. This analysis took place from September to December 2016. The sample of analysis contains five news outlets (four newspapers and one news website).

The main findings of the analysis show there is a predominant presence of data visualisation articles as compared to other types of articles, such as news reports and feature articles. Also, the subject of the story unit was dominated by stories about the world, these stories accounted for 151 out of 583 analysed stories, and maps and infographics were the most used type of visualisation. In terms of sources of information, the government and websites were the most common source of information, also the analysed news outlets tend to rely on internal production to produce their data journalism content rather than relying on a third party to produce them. It is worth noting that most of these news outlets focus on soft news content rather than hard news content like investigative pieces.

By answering this question, this confirms, by way of empirical study, that data journalism practices are not exclusive to the Western part of the world but also exists in developing media system, such as the GCC. However, it is worth noting that data projects in the region tend to focus on soft news content, unlike their counterparts in the West where data journalism is used to cover both soft and hard news content. This is because investigative and thorough reporting is uncommon in the region (Rugh 2004), and because the GCC's journalists lack the analytical approach and the advanced data skillsets that their counterpart in the West enjoy. For example, there is a tendency to rely on secondary data rather than primary data, which is evident in the volume of self-generated data in the contents examined. Furthermore, this research showed newsrooms in the region rely on infographics as the main type of data visualisation; in contrast infographics are commonly only used in the initial stages of data journalism in other part of the world (Veglis and Bratsas 2017; Zhang and Feng 2018).

6.1.2. Research Question Two

What are the forms and practices of data journalism in these GCC states?

Toward answering this question, I conducted a thematic analysis of semi-structured interviews with senior level editors, journalists, designers, and people who work with data (e.g., data journalists, data analysts and programmers). The aim of these interviews was to identify the challenges that these individuals faced when producing data journalism content.

The main findings regarding this objective were that I identified five types of challenges that data journalism faces in the GCC, namely, challenges regarding the journalistic role and newsroom workflow, challenges regarding data and its access, institutional challenges, challenges caused by governmental impact on newspapers and challenges caused by economic pressure. In terms of challenges regarding journalistic role and newsroom workflow, the existing taxonomies of data journalism in the studied newsrooms showed that data journalism has altered the role of journalists in the newsrooms, by minimising their involvement in the data journalism procuration. Other elements related to challenges regarding journalistic role and newsroom workflow include: the increase of workload, shortage of time and the reluctant to implement data journalism in the newsrooms.

Institutional challenges relate to the impact of the institution on the data journalism process, these challenges take form in three aspects: censorship, inflexibility and lack of staff. On the other hand, the governmental challenges have two forms: government competition and restrictions placed on the freedom of press and information.

Answering this question indicates that journalists in the GCC face several challenges that may hinder or even prevent them from integrating data journalism in their newsrooms. The alteration of journalistic roles is one of the main challenges of data journalism, which is not totally unique to the GCC's newsrooms, but extends to other parts of the world (Engebretsen et al. 2018), where journalist seem left behind in the process of data journalism production. This may explain the predominant presence of the do-it-alone approach in the newsrooms studied, since the unqualified journalists tend to avoid working with data journalism content. In addition to this, the fear of change is considered as one of the main challenges to data journalism in the region, traditional journalists are reluctant to implement data journalism fearing it may jeopardise their role or it may lead to an increase in their workload.

In terms of institutional challenges, journalists in the GCC experience challenges that their counterpart in the West do not. Censorship is a major obstacle for non-liberal media systems such as those in the GCC countries. The institutional or self-imposed censorship has a negative impact on journalism practice and may prevent journalists from reporting on certain issues or publishing certain stories. Moreover, the centralised structure of newsrooms in the region has led to a lack of teamwork and cooperation, whilst at times imposing extra restrictions on journalists, since sometimes they are required to seek permission to work on certain issues and topics. Although these issues are specific to the GCC context, newsrooms in the GCC and in the West both suffer from the lack of well-qualified personnel to work with data in their newsrooms, this is caused by either by the inability to hire new staff or the shortage of qualified workers.

Government have likewise been the cause of some challenges to data journalism in the GCC. Government in the region generally produce and publish their own data stories without relying on newsrooms. That has led to governments recruiting data journalist to work for them as opposed to working for newsrooms and additionally as governments publish their own data journalism stories, journalists outside of the government are severely restricted from accessing data because the governments feel they do not need access to it. Further compounding the problem is the governmental restrictions on freedom of press and freedom of information, both of which are a common practice for non-liberal media systems in the GCC.

Furthermore, economic pressure has caused challenges to implementing data journalism. Due to economic and financial difficulties newsrooms have been unable to hire new staff to work on their data projects, acquire the necessary tools to work on data projects and expand the data team so that they can produce high-quality content.

6.1.3. Research Question Three

How is data journalism viewed, understood, and operationalised within GCC newsrooms?

To achieve this objective I conducted a thematic analysis of semi-structured interviews with senior level editors, journalists, designers, and people who work with data (e.g., data journalists, data analysts and programmers). These were conducted in order to identify how data journalism is produced in the analysed newsrooms, and how each newspaper actually practises data journalism.

I defined four taxonomies of data journalism practices in the studied newsrooms. The first taxonomy is the data analyst driven content (Makkah), the second is the data analyst/designer content (Shabiba), the third is journalist driven content (Alroeya) and the final taxonomy is external/internal content (Alwatan).

The identification of these taxonomies has showed that data journalism is being practiced in a unique way in the GCC, that may overlap with some existing models in the West. But generally, each studied newsroom has its own method to produce such content even in regional level. The discrepancy of the workflow may be caused by the several elements, such as the staff and recognising the importance of data journalism. Another cause may be because each newsroom has its own motivation to implement new journalistic styles in their news production, which vary from improving their content in order to stay competitive to a tool of survival and staying relevant.

In the wider context, these taxonomies have shown there is a difference between data journalism practice in the GCC and in the West, and it is not appropriate to put them in the same group when evaluating their practice. One of the main differences is the lack of quantitative-oriented reporting among the GCC's journalists, which has a long legacy in the West. Likewise, the difference in the technological capability where the West enjoy more advanced tools that are not available to their counterparts in the GCC, either because they lack the skills to work with them or because they are only functional in the English language.

6.2. Contribution to practice

In terms of the contribution of this research to the industry, I propose a data journalism model/workflow that news outlets in the region can apply in order to establish data journalism practise in their newsrooms. The model is divided into two workflows, the first is related to daily data journalism content, while the second is related to advanced data journalism content. However, in order to implement this model, newsrooms need to first establish a unit/team that is responsible for producing data journalism content, or at least identify newsroom personnel that able and competent enough to execute the steps outlined in the workflow. The model considers the fact that staff do not currently possess advanced analytical skills in the GCC newsrooms; therefore, the daily workflow only requires basic knowledge of data analysis. Furthermore, it does not require any background in coding or programming since it is not intended to for the production of interactive content. The skills that staff need to have are the ability to handle data (e.g. collecting, storing and analysing), as well as the ability to use open source tools for data analysis and visualisation, such as Google Sheets, Microsoft Excel, Google Map, and the products of Knight lab such as timeline and story map.

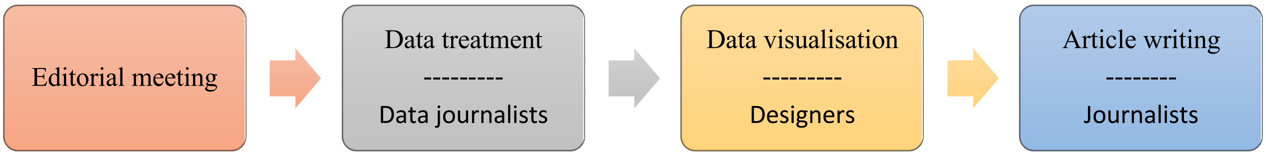


Figure 8. The daily data journalism model

The first step of the daily data journalism content model is the editorial meeting, according to the model the data journalism unit/team or staff need to be present in the meeting. This is required so that they can make or hear suggestions about daily data journalism content, the meeting attendance will highlight data journalism as being an important part of the news circle. Step two of the model is the data treatment; the treatment step will determine the role of the data in the story as well as the types of data required in the story. After deciding the role and the type of data, journalists need to collect and analyse the data. When the journalist has completed the task of collecting and analysing data, he/she needs to brief the designer about the angle of the story and suggest a type of data visualisation. Step three of the model involves the data visualisation by the designer, who by this point should have already been briefed about the story and type of visualisation. The final step of the model is the article writing, which in some data content is not required since it is stand-alone data visualisation.

Advanced data journalism content on the other hand, enables newsrooms to produce more sophisticated data journalism content, and is based on an extensive analysis of single or multiple datasets. Moreover, the visualisation is usually more advanced and complex, in some cases it could involve coding in order to produce interactive content. Advanced content is divided into two parts: a) big data projects that require thorough research and staff need time to complete, or the visualisation requires a lot of time to be completed. b) Future events that require special coverage and are either national or international, such as the World cup and United Nations summit. It is important to note that advanced content is not a quick turnaround content, it may require teamwork to produce or in some cases it may need cooperation with an outsourced/third party to conduct some of the content's elements.

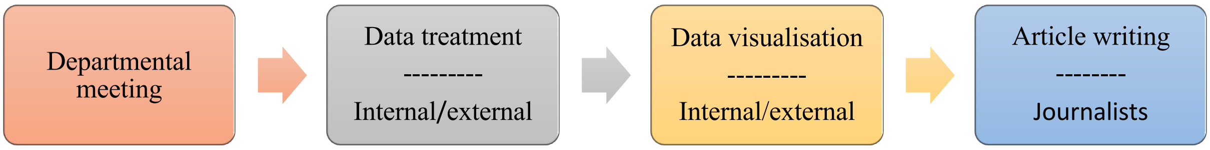


Figure 9. The advanced data journalism model

In step one of the advanced data journalism model, instead of an editorial meeting as in the daily model, the data journalism department needs to meet on a daily basis. The aim of the meeting is to track the work progress of ongoing projects, also to suggest upcoming events to be added to the work agenda. In addition, the meetings will draw the outlines of current and new projects, as well as delegate tasks among the team members. Furthermore, in the departmental meeting, the team leader will appoint a communication officer, if the content requires outside cooperation. This communication officer will be responsible for assisting and following the progress of the content. Data treatment is the second step of this model, this step involves collecting, cleaning, storing and analysing the data of the story. The newsroom has the choice to execute this step internally or externally, however if they opt to do it internally, they should have the personnel with the right skillsets to do it. The skillsets include advanced data analytical skills, such as statistical knowledge and data communication, as well as the ability to data mine and the ability to use programming language and software such as R language and Python. Step three of this model is similar to step two in terms of the option of conducting the steps internally or externally. Though, if the newsroom chooses to do it internally, it should have the appropriate staff to do so. He/she must have advanced data visualisation skills, these include the ability to use open source tools to visualise data such as D3.Js and Polymaps. In addition to this, the worker must have advanced knowledge of design software such as Advanced Design System (ADS) and Adobe Illustrator and InDesign. It is important to note that the newsroom has the ability to assign either one of these steps or both of them to a third party, also they have the choice to assign each step to a different third party. The ability of outsourcing some of data journalism tasks is similar to Uskali and Kuutti's (2015) entrepreneur model or the sub-contractor model that was discussed in section 5.3. Uskali and Kuutti's (2015) model is based on the ability of data journalists to work on different projects in different news organisations at the same time. Step four of this model involves the article writing, although in some cases this is not required since the content is standalone visualisation, which was the case for most of the studied content in the GCC's news outlets.

6.3. Research limitations and recommendations for future research

As any research, this thesis has its limitations, and these may impact the quality of this piece of research. Some of these limitations are outlined below:

- This research is considered as one of the first projects that examines in depth data journalism in the region, several of the previously published works were focused on the Arab world as a whole, rather than a specific region such as the GCC. Therefore, I do not have the privilege of benefiting from specific and related previous studies that could have aided him throughout the research.
- Studying an emerging practice, it is not an easy task, and this task was made more difficult due to the fact that data journalism has a number of issues regarding its terminology and usage. This confusion and a lack of clearly distinguishable features between data journalism, CAR, CJ and news infographics imposed analytical challenges for me.

- Examining journalism practices in the GCC is a complicated task, especially when issues such as governmental interference and freedom of press are discussed. Interviewees tend to be cautious and reserved, despite me granting assurances of their anonymity.

  The political atmosphere in the region has impacted the research in different ways. To begin with, my home country (Saudi Arabia) cut its diplomatic relation with Qatar, this prevented me from the inclusion of Qatari news outlets in the research. Furthermore, the suspension of Al Wasat newspapers by the Bahraini government forced me to replace the paper in phase two of research.

In terms of recommendations for future research, I propose the following:

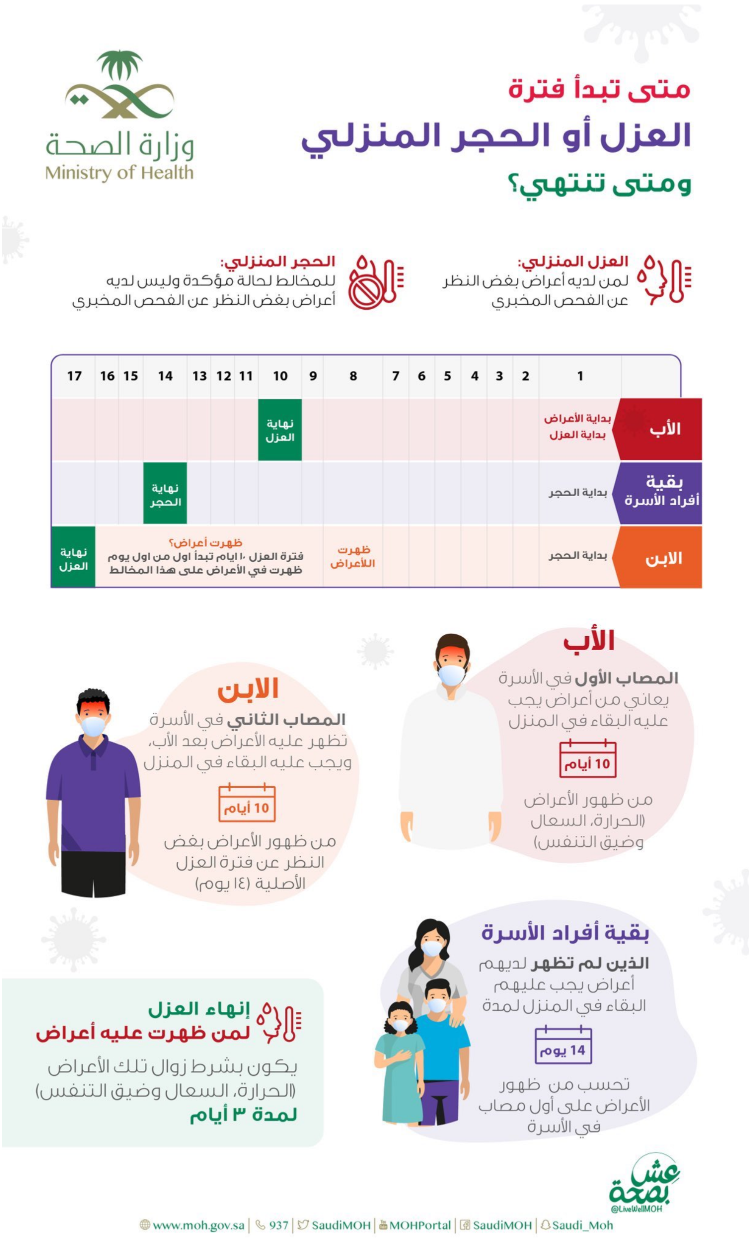
- There is a need to update the Arab media system typology to accommodate the recent changes in the region such as the Arab Spring, also the technological advancement of news making process.
- There is a need to separate the Arab world into several parts, since there are huge differences between the GCC and rest of the Arab world. For instance, Allagui and Ayish (2017) argued that the GCC countries enjoy world-class IT infrastructure unlike the rest of the Arab world. Also, the governmental system in the GCC countries is different from most of the Arab world countries.
- There is a need to develop a new business model for newspaper in the region, this business model should accommodate the recent development in news production. It should also place emphasis on the newspaper's independence from the government as a source of income, this will in turn have a positive impact on their published content and practice.

- There is a need to examine how the GCC readers observe and view the use of data journalism in the region's newspapers. This should be done in order to verify the claims that data journalism has contributed to the increase in newspaper readability and shareability.

6.4. COVID-19 Reflections

The COVID-19 pandemic occurred during the final stages of this research, impacting the progress of the research, as well as the future of data journalism in the GCC. It has had a great implication on the economics related to the news making process in the region. As previously discussed, newsrooms in region already suffer from a shortage in the budgets preventing them from new hiring staff or implementing new journalistic styles such as data journalism. This pandemic has led to further financial worries for newsrooms attributed to a lack of advertisements in newspapers causing more strain in newsrooms' budgets. Consequently, it may cause some setbacks in implementing data journalism in newsrooms in the region or prevent data journalism adaption completely in order to minimise the newsrooms spending.

However, one of the positive implications of COVID-19 on media landscape in the region is the recognition of the importance of data in the news stories. It was evident in the wider usage of data and statistics to cover the pandemic news, not only the news workers but also the readers started to develop an appetite towards data driven articles. For instance, the Health Ministry in Saudi Arbia relied on data visualisation pieces in their campaign to inform people about the risk of this pandemic (see the picture). Likewise, some the health workers used data articles from different sources to simplify issues regarding the pandemic. For example, Dr. Bandar Alosaimi publish several tweets and posts concerning it, one such post discussed the asymptomatic and symptomatic immune responses (Alosaimi, 2020).



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%D8%A7%D9%84%D8%AA%D9%82%D8%A7%D8%B9%D8%AF-%D9%88%D9%87%D9%85%D9%8A%D8%A9 [Accessed 20 Jul 2020].

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8. Appendices

8.1. Sample of how-to infographic

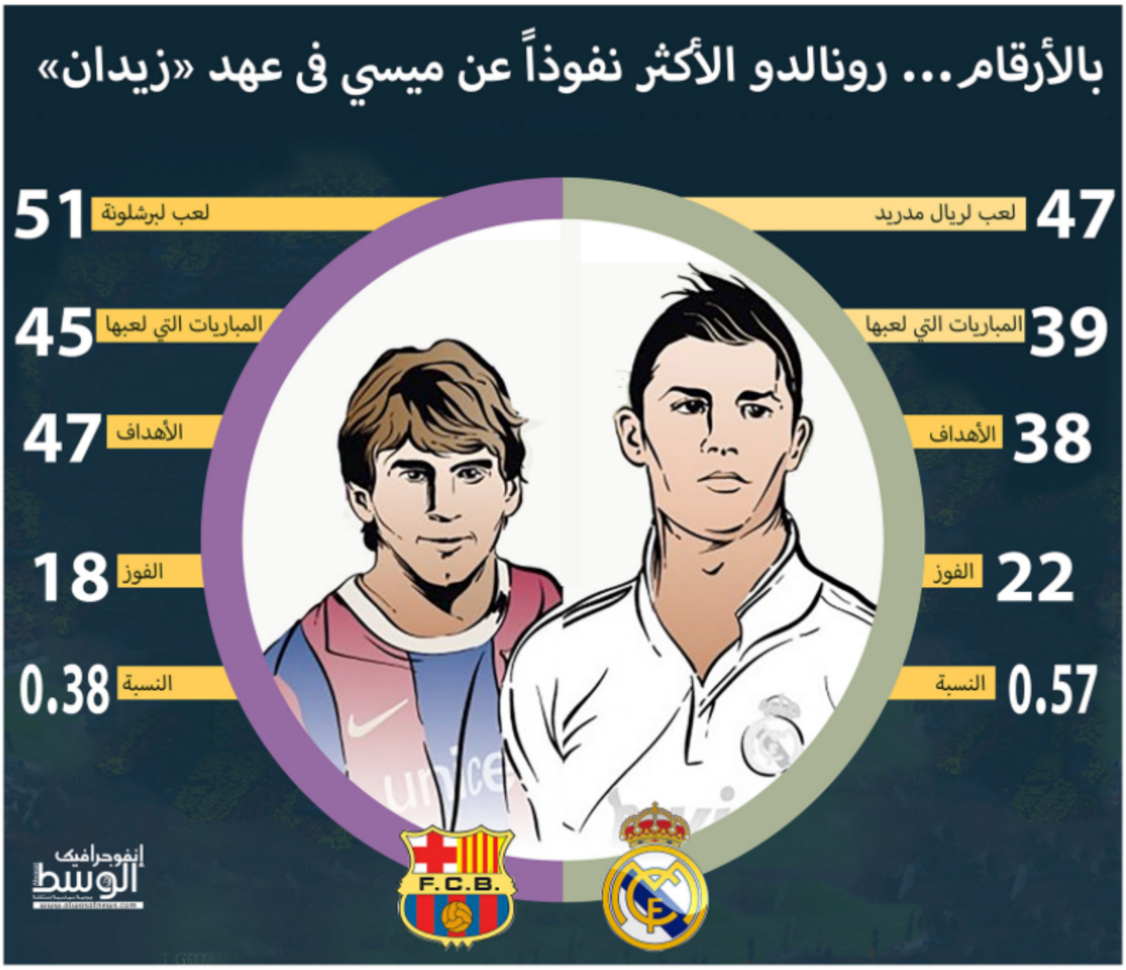
المزيد من

الثلاثاء 24 محرم 1438 - 25 أكتوبر 2016

خطوات تجعل يومك أفضل

8.2. Sample of Vs infographic

انفوجرافيك... بالأرقام... رونالدو الأكثر نفوذاً عن ميسي في عهد «زيدان»



تحديث: 12 مايو 2017

8.3. Sample of Did-You-Know infographic

8.4. Sample of combination infographic

إحصائيات مطارات عُمان: 2015-2016

الثلاثاء، ٢٢ نوفمبر، ٢٠١٦