
KADIR HAS UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
NEW MEDIA DISCIPLINE AREA

# USE OF DATA VISUALIZATION IN NEWS REPORTING IN TURKEY

SADETTİN DEMİREL

SUPERVISOR: PROF. DR. SEVDA ALANKUŞ

MASTER'S THESIS

ISTANBUL, JUNE, 2018

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# ACCEPTANCE AND APPROVAL

This work entitled "Use of Data Visualization in News Reporting in Turkey" prepared by Sadettin Demirel has been judged to be successful at the defense exam held on 06.06.2018 and accepted by our jury as a master thesis.

Prof. Dr. Sevda Alankuş (Advisor) - Kadir Has University

Assoc. Prof. Dr. Çiğdem Bozdağ - Kadir Has University

Assoc. Prof. Dr. Erkan Saka – Istanbul Bilgi University

I certify that the above signatures belong to the faculty members named above.

Prof. Dr. Sinem AKGÜL AÇIKMEŞE
Institute Director
6/6/18

**DISCLAIMER**

"I, Sadettin Demirel, hereby declare that this master's thesis is my own original work and that due references have been appropriately provided on all supporting literature and resources."

Sadettin Demirel

Date: 02.08.2018

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# ABSTRACT

DEMİREL, SADETTIN, *USE OF DATA VISUALIZATION IN NEWS REPORTING IN TURKEY,* MASTER'S THESIS, ISTANBUL, 2018

The purpose of this thesis is to reveal the current state of the use of data visualization in news reporting and challenges of integrating data visualization in news making in Turkey. Unlike the previous studies' graphic design perspective to the subject of data visualization, this thesis approached the subject of data visualization from the journalistic perspective in Turkey. Mixed method approach was used to scrutinize the subject of the thesis. The method contains two components which are a quantitative content analysis to monitor use of data visualization in 5 selected newspapers and 5 selected digital news outlets for three weeks and qualitative semi-structured interviews that provide deeper understandings and opinions of 10 news editors and reporters from news media outlets regarding challenges they encounter in the process of utilizing data visualization in news reporting. Also, relevant pieces of academic literature, local and international news media reports and surveys were used to examine the subject more thoroughly. Qualitative and quantitative findings that were derived from the conducted research and secondary sources indicate that use of data visualization in news media was not a sufficient level and newsrooms face internal and external challenges in this process. These are lack of time to work with data, lack of technical skills, limited features of data analyses and data visualization tools, lack of available and tidy data and unsuitable data formats, the absence of reader's interest, unsustainable business model, and current political atmosphere.

**Keywords**: data visualization, data journalism, journalism, news, data

# ÖZET

DEMİREL, SADETTİN, *TÜRKİYE'DE HABERCİLİKTE VERİ GÖRSELLEŞTİRME KULLANIMI*, YÜKSEK LİSANS TEZİ, ISTANBUL, 2018

Bu tezin amacı Türkiye'de habercilikte veri görselleştirme kullanımının mevcut durumunu ve veri görselleştirmenin haber üretimine entegre edilmesinin önündeki güçlükleri ortaya koymaktır. Veri görselleştirme kavramına grafik tasarım yönünden yaklaşan önceki çalışmaların aksine, bu tez veri görselleştirme konusuna gazetecilik perspektifiyle yaklaşmaktadır. Mevcut tez konusu karma yöntem kullanılarak çalışılmıştır. Uygulanan karma yöntem yaklaşımı 5 gazetenin ve 5 dijital haber portalının veri görselleştirme içeren haberlerinin izlendiği nicel içerik analizi ve ulusal gazetelerde ve online haber portallarında çalışan 10 haber editörü ve muhabiri ile yapılan nitel yarı yapılandırılmış mülakatlar olmak üzere iki ayrı bileşenden oluşmaktadır. Ayrıca ilgili akademik literatür, ulusal ve uluslararası haber medyası raporları ve anket araştırmaları konuyu daha detaylı incelemek için kullanılmıştır. Yapılan araştırmadan ve ikincil kaynaklardan edinilen nitel ve nicel bulgular Türkiye'de habercilikte mevcut veri görselleştirme kullanımının yeterli seviye de olmadığını ve bu süreçte haber merkezlerinin iç ve dış kaynaklı güçlüklerle karşılaştığını göstermektedir. Veri ile çalışırken zamanın yetersizliği, teknik beceri eksikliği, veri görselleştirme ve analiz araçlarının yetersizliği, mevcut düzenli veri miktarının yetersizliği ve uygun olmayan veri formatları, okurunun ilgisizliği, sürdürülebilir olmayan iş modeli ve politik atmosfer ifade edilen zorluklardır.

**Anahtar Kelimeler**: veri görselleştirme, veri gazeteciliği, gazetecilik, haber, veri

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Istanbul, June 2018

# INTRODUCTION

Although using data for journalistic purposes has been assumed as a new trend for news reporting, utilizing quantitative data has always been the part of the news-making. The difference between now and past is that today's advanced new media technologies, the ubiquity of data with data leaks and open data movements, free and open source data analysis and data visualization tools have paved the way for the practice of data journalism and data visualization in news reporting. While more and more US and European newsrooms have employed data journalism processes and invested in this field to integrate their own news-making, there are only a couple of sparks in Turkish news media regarding data journalism and data visualization. Despite the fact that the adaptation of new information and communication technologies have been followed by news media in Turkey, which are the transition from newspapers to online web portals, use of social media to attract more traffic or reach extra audiences, news media organizations have not shown any indications and tendencies to adapt their news practices into quantitative turn of journalism yet.

The subject of data visualization has been mainly studied by undergraduates, post-graduate students from the graphic design perspectives in Turkey. For the first time this study approached the craft of data visualization from journalism perspective. Therefore, the purpose of this study is to find out current use of data visualization in news reporting and its challenges newsrooms face in Turkey.

First of all, the definitions of data visualizations, the related phrases, and terminologies that are used in the news industry and history of data visualization in news-making have been covered by using relevant pieces of literature. Secondly, data journalism which contains data visualization as a fundamental process, and its descriptions and developments were addressed by the help of articles, news media reports, international surveys. Thirdly, in order to identify under which conditions Turkey's news media operates, news media landscape in Turkey and certain dynamics such as media ownership, business models, press freedom were assessed. After that, the quantitative and qualitative insights from content analysis of current print and digital news media organizations and reflections of editors & reporters in Turkey have been pointed out within the framework of the research questions below:

1. How is the current state of the use of data visualization in newspapers and digital news media?
2. What are the current challenges of using data visualization in news reporting in Turkey?

i) Do current business models of news media in Turkey impact investing in data visualization?
ii) Does current political atmosphere in Turkey affect news media on investing in data visualization

3. Do reporters have a good grasp of trends and technologies in data visualization and data journalism?
   i) Do newsrooms in Turkey hire data visualization experts or data journalists to cover stories with data?
   ii) Do newsrooms in Turkey encourage their employees to train themselves for data visualization?

# 1.RESEARCH METHODOLOGY

In order to study the use of data visualization in news reporting and to find out its challenges newsrooms face in Turkey, mixed method research methodology was preferred. The conducted mixed method approach in this thesis includes quantitative content analysis of data-driven news stories that were published in newspapers and digital media portals between 19th February and 11th March 2018 and qualitative interviews with 10 media professionals from national dailies and online news portals via face to face meeting, video calls, and electronic mail.

I carried out my research with mixed method because of two main reasons. The first reason is to benefit from both quantitative and qualitative findings to make viable inferences, because "mixed method is the combination of at least one qualitative and quantitative component in a single research" (Bergmann, 2008, p. 2). Also, unlike other research methods, the mixed method prevents taken for granted assumptions about the matter of subjects (Bergmann, 2008). The second reason is that the two components of the mixed method complete each other on this subject of the study. While quantitative content analysis provides overall state of the use of data visualization and constructs an analytical framework, semi-structured interviews yield a deeper understanding of the subject which is the current challenges newsrooms face during the adaptation of data visualization in news-making. Thus, the mixed method was conducted to harness the power of quantitative and qualitative insights to delve into the use of data visualization in news media.

## 1.1 QUANTITATIVE CONTENT ANALYSIS

The first component of the mixed method which is quantitative content analysis was carried out by monitoring news stories with data visualization (infographics, chart, video graphs) in five selected newspapers: Cumhuriyet, Hürriyet, Habertürk, Sabah, Sözcü and five online news portals: Anadolu Agency, BBC Turkish, Birgün.net, Evrensel.net, 140 Journos for 3 weeks from 19th February 2018 to 11th March 2018. The newspapers were picked to reflect balanced political views while online news portals were chosen from digital news media outlets that produce data-driven news contents because data driven reporting has been a newly practiced field in Turkish news media. The research data was compiled into a spreadsheet by using six different parameters: name of the news media, date of the news story, news category, data visualization technique, data source. While newspapers were monitored from their printed issues, online news portals were monitored via RSS and their websites. After the datasets were

compiled, some parameters were reduced to clean and tidy the datasets for evaluation. Then daily frequency of news reports that were published with data visualization per news media, data savvy news report distributions per news categories (politics, economy, social, technology), use of data visualization techniques in the story (line chart, pie chart, map etc.), use of data sources in the news reports (government offices, international organizations or NGOs were analyzed by Google Tables to evaluate percentages and distribution of values. Next, the results from newspapers and digital news portals compared with each other. The findings were used to make inferences regarding the current state of the use of data visualization in news media. Therefore, the findings of first component in mixed method not only build an analytical framework to support the claims of this study but also lay a groundwork for the latter section of the research approach.

### 1.2 SEMI STRUCTURED QUALITATIVE INTERVIEWS

The second component of the mixed method is the qualitative interviews. In order to find out what are the current challenges of using data visualization in newsrooms, semi-structured interviews with 10 news editors who have experiences on data journalism and data visualization from national dailies and digital news portals were conducted via face to face, video calls, and electronic mails. The six out of ten interviews were face to face interviews. Three editors were reached via electronic mail and one reporter was interviewed via Skype call. The face to face interviews and skype call interview lasted about 30 minutes. The face to face interviews were made in respondents' offices in their newsrooms.

1) Mehmet Özer, News Editor, Evrensel.net (face to face interview)
2) Uğur Şahin, News Editor, Birgün.net (face to face interview)
3) Anıl Karaca, News Editor, Birgün.net (face to face interview)
4) Naime Sert, News Editor, Habertürk Daily, (electronic mail)
5) Pınar Dağ, Data Journalist, and Data Journalism lecturer, Dağmedya (face to face interview)
6) İrem Köker, Reporter, BBC Turkish (video call)
7) Erhan Esen, News Editor, Hürriyet Daily News (face to face interview)
8) Turgut Yıldız, News Editor, and Designer, Sol.org.tr (electronic mail & telephone call)

9) Can Pürüzsüz, News Editor, 140 Journos (face to face interview)

10) Ceyda Ulukaya, Multimedia, and Social Media Editor, Bianet.org (electronic mail)

Also, quantitative content analysis and semi-structured interviews were supported with insights from the relevant pieces of literature, news media reports, and surveys regarding the use of data visualization and data journalism in news reporting.

# 2. DEFINITIONS AND HISTORY OF DATA VISUALIZATION

## 2.1 DEFINITIONS

Data visualization is an interdisciplinary craft that has become a popular buzzword in many fields, such as statistics, data science, business intelligence, news reporting etc. However, despite the deep roots and multi-dimensional aspects of data visualization (Friendly, 2009; Kirk, 2012), there are a few unanimous definitions. Furthermore, both the academic literature and the practitioners created complexity by labeling the practice with various terms, for instance, information visualization, data visualization, infographics, information graphics, news graphics etc. to define or describe the craft.

Scholars and practitioners who study this field approached data visualization from different perspectives. Friendly (2009, p. 2) approached the practice from the statistical perspective by defining it "the science of visual representation of data" and "information which has been abstracted in some schematic form, including attributes or variables for the units of information". Unlike this terminological and technical definition, there are also simple descriptions of the data visualization. Krum (2013, p. 2) describes the data visualization as "the visual representations of numerical values". He also limits the practice by pointing out "charts and graphs are data visualizations and create a picture from a given set of data" (Krum, 2013, p. 2). It can be clear to say that we can agree upon that data visualization is the representation or display of abstract or numerical data in the light of these definitions.

On the other hand, there are also definitions that relate the data visualization practice to a communication model and attribute analysis, discovery and many aspects of the craft. Kirk (2012) sees data visualization as a part of the communication model and asserts that data visualization is a message that flows from messengers to receivers in a variety of forms such as a chart, an online interactive or infographic etc. In his book, Kirk (2012) states that data visualization is "the representation and presentation of data that exploits our visual perception abilities in order to amplify cognition". Few (no date) has also similar definition but he also explains two purposes of data visualization: "Data visualization is the graphical display of abstract information for two purposes: sense-making or data analysis and communication". Unlike these definitions that try to specify data visualization by explaining what is it, Kosara (2008) focuses on the visualization broadly and comes up with a radical consideration that the visualization term is a problematic and since it is easy to argue anything visual is a visualization, the question of what is not visualization is more important. He also proposes three features that any visualization work should have (Kosara, 2008): the first is being based on non-visual,

abstract data, because as Kosara (2008) states that main aim of the visualization is communication of data so that visualization converts invisible to visible. The second is that visualization should produce an image and the third is the result of the visualization process should be readable and recognizable (Kosara, 2008). Furthermore, Cairo (2016) puts a similar consideration to Kosara's views on visualization. Cairo (2016, p.29) points out that "visualization is my umbrella term. Visualization is any kind of visual representation of information designed to enable analysis, discovery, exploration etc.". While this definition may attribute related aspects to the visualization as Kirk's (2012) Kosara's (2008) and Few's (no date) definitions did, Cairo (2016) has also a specific description for the practice of data visualization:

> A data visualization is a display of data designed to enable analysis, exploration, and discovery. Data visualization are not intended mainly to convey messages that are predefined by their designers. Instead, they are often conceived as tools that let people extract their own conclusions from data (Cairo, 2016, p. 31).

In the light of these definitions, all of the scholars agree that data visualization is the representation of information or numerical values, while some of them ascribes a communication process and analysis, exploration features to the data visualization practice (Kirk, 2012; Few, no date; Kosara, 2008; Cairo, 2016). However, these are the only common grounds these scholars unite on visualizations of data because there is no agreed definition of the craft. This may be because the term is related to different fields and the scholars who studied this fields may be from different branches. Kirk (2012) asserts that owing to the fact that data visualization is a dynamics and evolving field universally agreed description will be hard to construct. Currently, there are various kinds of terms address the practice of visualizing data and occupy the academic literature and sectors related to data visualization. These are data visualization, information visualization, scientific visualization, infographics, news graphics, news applications etc. (Friendly, 2009; Kosara, 2010; Kirk, 2012; Krum, 2013; Cairo, 2016; 2017).

### 2.1.1 Complexity of terms

Some of the variety of terms has been addressed by Friendly (2009) when he draws the scope of his works in data visualization. According to Friendly (2009), information visualization is the representation of largescale non-numerical values such as files and codes in software environment while scientific visualization is related with the three-dimensional matters such as architectural, meteorological, etc. Also, Friendly (2009, p. 2) accepts that information visualization is the broadest term among these while data visualization, "science of visual

representation", is a specific branch. While what Friendly (2009) means with data visualization is statistical graphics and cartography, Krum's (2013) stance regarding this matter is based on infographics and data visualization. Krum (2013) claims that data visualization and infographics are considered as same terms but it is not. According to Krum (2013), data visualization is the display of quantitative values, whereas his definition of the infographic is that "a larger graphic design that combines data visualizations, illustrations, text, and images together into a format that tells a complete story" (Krum, 2013, p. 6). While he also acknowledges the power of data visualization which is an efficient way to communicate data by visualizing large datasets, he sees data visualization as a tool to enrich infographics (Krum, 2013). Therefore, it can be said that data visualization is just an element like text, illustration in infographics for Krum (2013). In contrast, Kosara (2010) argues that "visualization is general and infographics are specific" because of two reasons. The first is that visualization that can be made with a program can be applicable and reproducible for different datasets but infographics are prepared for the certain datasets (Kosara, 2010). The second reason is that unlike the data visualization, an infographic is context-sensitive due to the fact that infographics are hand-crafted (Kosara, 2010). Hence, it's clear that Kosara accepts infographics as a sub-branch of the visualization so that unlike Krum (2013), visualization is the more general term for Kosara (2010). Moreover, Cairo (2016) shares the same notions on the matter with Kosara, which he argues that "visualization is my umbrella term" (Cairo, 2016, p. 29). According to Cairo "an infographic is a multi-section visual representation of information intended to communicate one or more specific messages", while "data visualization is a display of data designed to enable analysis, exploration, and discovery" (Cairo, 2016, p. 31). Also, Cairo differs data visualization from infographics by pointing data visualization is not to communicate messages which are curated by designers, but it is thought as tools to enable people to obtain their own findings out of datasets (Cairo, 2016). Cairo (2017) also emphasizes these structures of data visualization and infographics in his doctoral dissertation too, which is similar to the Kosara's (2010) arguments, "infographics provides context, offers readers a complete overview of a story" while data visualization is to convey unidirectional messages from emitter to a receiver (Cairo, 2017, pp. 27-30). Aside from the difference in functions between data visualization and infographics, Cairo (2017, p. 22) notes that "infographic has a nostalgic resonance" and "it belongs to the era of the printing press" (pp. 29-30). Although there is difference in functions and purpose between infographics and data visualization, Cairo (2016, p. 31) points out that "boundaries between these terms are not very clear even when we talk about static charts" and there are still

hybrid projects in news media to "blur any possible boundaries between infographics and data visualization" (Cairo, 2017, p. 31).

Furthermore, despite the complexity of the phrases, there are new terminologies that are used to describe the practice of data visualization in digital news media. According to Cairo (2017) news application for the form and visuals or interactive journalism for the department of news media have been used by NPR and ProPublica. Also, news application is defined by Cairo (2016) as special sort of visualization which enables people to make sense of the data being displayed to their life and the main aim is to customize the work per person.

As a result, there is no resolution yet at the difference of this variety of terms that label the practice of visualizing data in news media and besides there are new phrases that begin to be used to define the craft of data visualization as the new technologies emerge. However, for the purpose of this study, data visualization will be the terms to describe the practice of visualizing data in news media.

### 2.1.2 Importance of Data Visualization

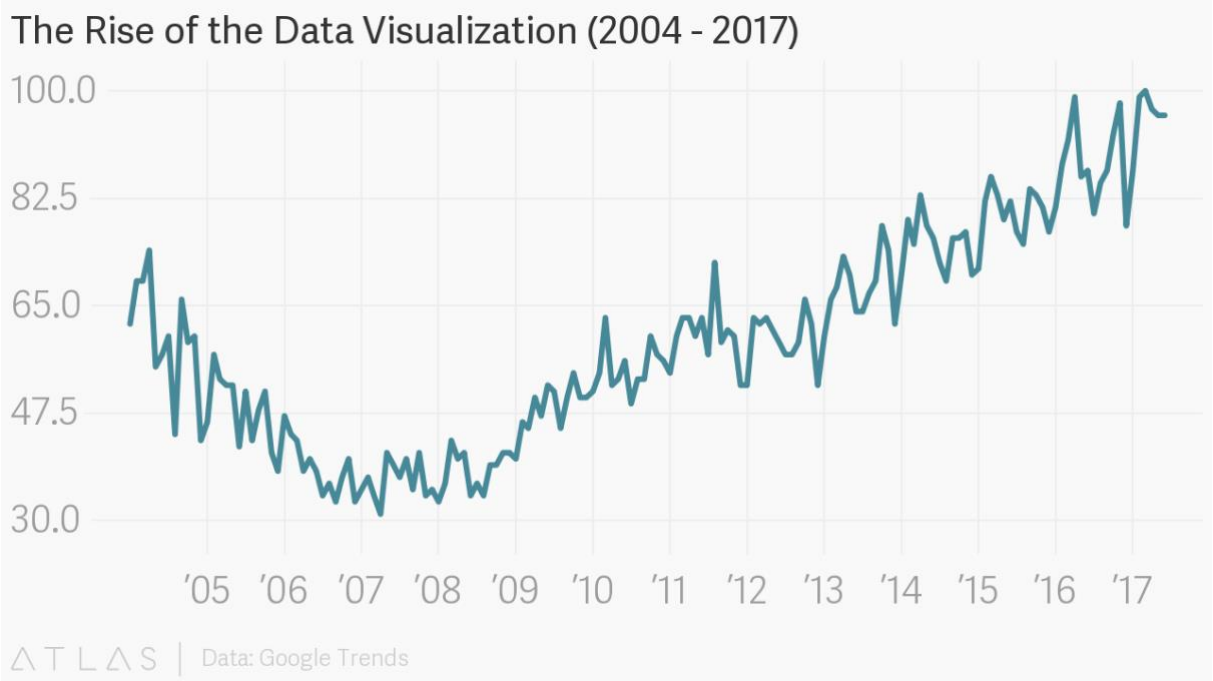
Even though data visualization may be perceived as a new field, just the opposite it has a deep historical past and been around in different forms (Friendly, 2009; Kirk, 2012, Krum, 2013). Although from this long history there are variety of phrases that describe the practice (Friendly, 2009, Kosara, 2008; 2009, Kirk, 2012, Krum, 2013, Cairo, 2016; 2017), whether this complexity of terms creates confusion or not, there are certain conditions that popularizes the data visualization in news media and business industry. Data visualization becomes prominent field due to the fact that new information and communication technologies and the tendency toward accessibility and transparency of data (Kirk, 2012). Furthermore, the importance of the data visualizations is also derived from its own features as Cairo (2016), Few (no date) and Kirk (2012) indicate analysis, exploration, sense-making, communication. In this case Few (no date) points out that data visualization is a powerful means to explore and understand stories in data and present them to other people, while Kirk (2012) emphasize not only the value of data and amount of data in our age but also the importance of data visualization practice, which facilitates readers to seeing data rather than looking at it.

On the other hand, there is a new journalism trend- data journalism- that ascribes data visualization as one of the main processes of news reporting. While data journalism can be defined as doing journalism with structured data (Kayser-Brill, 2015) or as Stray (2011) states that "data journalism is obtaining, reporting on, curating and publishing data in the public

interest", data visualization constitutes as a tool to enrich the story by transforming the invisible, abstract information or numerical value to visible insights (Kosara, 2010). This specific step in data journalism can be seen in Bradshaw's the inverted pyramid of data journalism model (Bradshaw, 2011b) too. After the data is prepared through the compile, clean, context and combine process, there is communication phase which contains visualization step along with narrating, socialize humanize, personalize and utilize steps (Bradshaw, 2011b). Also, according to a data journalist, Miller (2013) data visualization facilitates readers to relate information to the news stories and it improves the storytelling and uses web ability and new elements to enrich the news. Similarly, journalists from BBC, Hurrell, and Leimdorfer (2012) emphasize that engaging visualization works are able to provide a greater understanding of the topics or issues for readers. Because Aisch (2012**)** notes that data is invisible, abstract bits and bytes in a computer or electronic storage and one should visualize it in order to make sense of. Also, data visualization is one of the core staffs in data journalism newsrooms, because data teams require not only computer-assisted reporter and news application developer, but also data visualization experts (Gordon, 2013).

Moreover, there are also studies that illustrate the value of data visualization craft and the level of demand for it. According to a survey conducted by European Journalism Centre (n = 200) the second most demanded skills to be acquired by journalists is to visualize data by 66% of response (Bradshaw, 2011a). Recently published more comprehensive research that was conducted by Google News Lab (interview with 56 journalists and survey with 900 reporters in the USA and Europe) shows that data visualization is viewed as a more specialized skill by 83 percent of the respondents (Rogers, Schwabish, and Bowers, 2017). Lastly, as can be demonstrated in chart 1, increasing popularity of data visualization terms in Google's trending statistics is another evidence that displays the growing importance of data visualization in today's world (Chart 1).

**Chart 2.1:** Data visualization search trends in Google[1] (Data source: Google Trends)



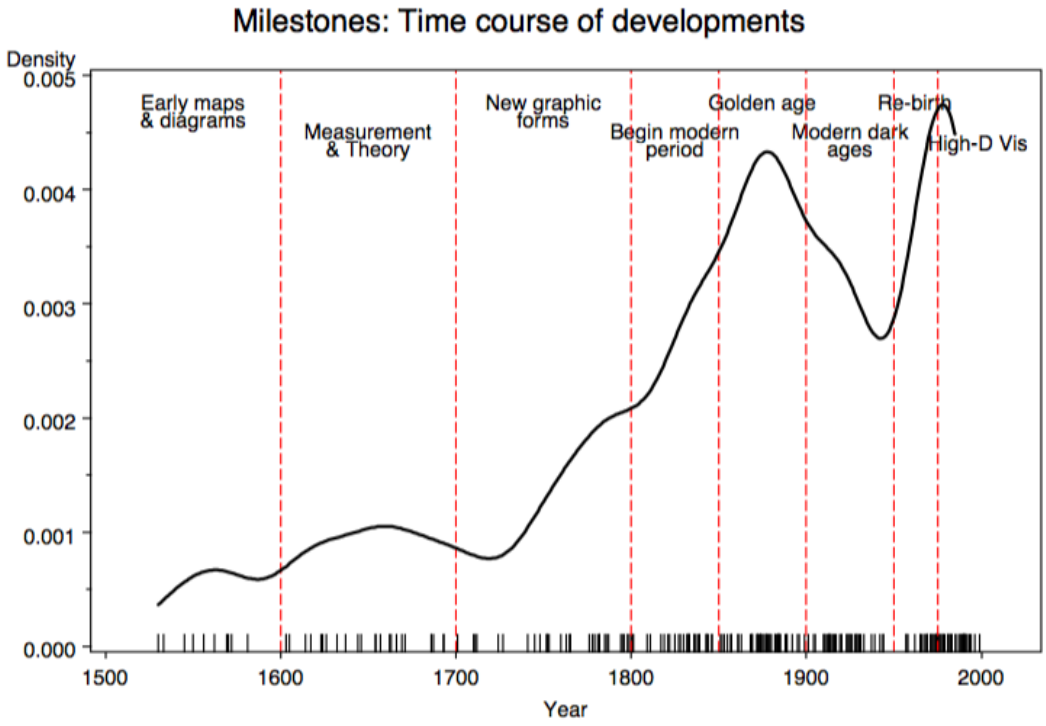

## 2.2 HISTORY OF DATA VISUALIZATION IN NEWS REPORTING

### 2.2.1 A Brief History of Statistical Graphics

Although data visualization is a popular term in today's world, it has deep historical backgrounds (Friendly, 2006; Kirk 2012). Similarly, the data visualization techniques that are widely used in many areas did not fall from the heaven. There is technological and scientific progress that contribute the developments of data visualization (Friendly, 2006). These breakthroughs build a base for the use of data visualization in finance, demography, journalism etc. Friendly (2006) in his groundbreaking works of the Milestone Project, which focused on the history of data visualization from the early 17th century to today, divided the history into eight periods of time.

[1] https://www.theatlas.com/charts/BkcwI40hW

**Chart 2.2:** Milestones of the developments of data visualization




The first period is the pre 17th century which was based on the developments of early maps and diagrams that were the works of ancient Egyptians and Ptolemy's spherical map projection (Friendly, 2006).

The second period is based on growth in theory and measurement throughout the 17th century, and one of the developments that aids the data visualization craft is the two-dimensional coordinate system developed by Descartes (Friendly, 2006; Few, no date). According to Few (no date) Descartes' two-dimensional coordinate system makes displaying one variable in horizontal and another in vertical axis easy, but the potential of graphical representation of quantitative values is not noticed until the 18th century.

The third era Friendly (2006) discussed is about the emergence of new graphical forms in the 18th century, which as Few (no date) mentioned. Also, Friendly notes that new maps in cartography started to display more than spatial regions and William Playfair, the inventor of most of the graph types used first line charts and bar charts within 18th century (Friendly, 2006; Few, no date).

The fourth era Friendly (2006) highlighted in his Milestones Project is the first half of 19th the century, which is the beginning of the modern charts. The first half of this century saw an

extraordinary growth in statistical charts and maps and most of the graphical forms had been established (Friendly, 2006).

As can be seen in chart 1.1, the next period of data visualization milestones is the golden age of graphics as Friendly (2006) puts it. The reason the second half of the 19th century is the golden age because of the suitable conditions which are official statistical offices and previous theoretical and technical developments have provided the rise of the use of data graphics (Friendly, 2006). Also, Friendly (2006, pp) argues that graphical representation of complex data structures became easy with the new graphical forms that were widely used in social issues, such as Minard's works that show Napoleon's Quest to Russia, Florence Nightingale's polar diagram that displays that sanitary conditions increased the number of deaths in Crimean War and Dr. Jon Snow's use of dot map to illustrate the spread of cholera through water sources.

The sixth period in the history of data visualization is the first half of the 20th century. Friendly (2008) states it was the modern dark ages in the period between 1900 and 1950 due to the fact that there are a few graphical innovations compared to the past, which it can be seen as a plummeted trend in the course of data visualization history (Chart 1.1).

The next period in the course of data visualization between 1950 and 1975 is called re-birth of the data visualization by Friendly (2006) thanks to not only works of the notable academics and statisticians such as John Tukey and Jacques Bertin but also the rise of computing technologies that enable computer-assisted graphic forms and interactive statistical applications.

Moreover, the last period of the history of data visualization in Milestones Project includes last quarter of the 20th century which the data visualization became multi-disciplinary area by the help of the theoretical and technical advances (Friendly, 2006). During this period, especially these breakthroughs such as commercial and non-commercial (mostly open-source) large-scale graphics software engineering, linear statistical modelling, increasing speed and capacity of computing technologies paved the way for interactive computing systems, direct manipulation of visual data analysis, new methods to visualizing high dimensional data, invention of new graphical representation and paying attention to the cognitive and perceptual elements of data display (Friendly, 2006).

Even though the work has done by Friendly (2006) covers these time period, Few (no date) fills the gap and argues that with the beginning of the 21st century, data visualization has gained popularity even if it attracts audience's attention through commercial products. However, these are the only the phases data visualization evolves through with time with advent of the technological and theoretical progress in a variety of disciplines, there is also news journalistic

side of the story that shed light on how data visualization has been used in news reporting and what are the implications of it throughout the history of the press.

### 2.2.2 Data Visualization in News Reporting

As it was mentioned above data visualization has relations with news reporting, because it is a multidisciplinary field and also past and current trends of journalism have benefited from this craft. For that reason, not only the statistical development of data visualization as which is that Friendly's Milestones Project but also the phases of journalistic use of data visualization matters for the scope of this study.

Despite the fact that use of data in news reporting has assumed a new trend in journalism similar to identifying data visualization as a newly popularized field, news has a deep historical relationship with data. As such the latest Google News Lab's Data Journalism in 2017 report revealed that data has been in use for hundreds of years in the news reporting and one of the early examples is that death and birth statistics were sold in London in the 17th century (Rogers, Schwabish, and Bowers). Unsurprisingly it is the same century newspapers had been sighted in Europe (Tokgöz, 2000). Furthermore, Anderson (2015) shares the same notion that working with data to tell stories is not a recent way of news-making because using data and creating data visualization has been part of news reporting for long time.

On the other hand, even though there are bold arguments about the use of data and data visualization throughout the history, the studies on this subject are scarce except the works of Friendly (2006) and Cairo (2017). While Friendly (2006) stated the technological and technical evolution of data visualization, Cairo (2017) particularly focuses on news graphics which is another phrase of data visualization. In his doctoral dissertation, Cairo (2017) reveals valuable insights that how news graphics evolve with use of data and digital technologies throughout the history (Cairo, 2017). Also, how newsroom dynamics have changed with the evolution of data visualization is emphasized by Cairo (2017).

The history of data visualization in news reporting is covered by Cairo (2017) with five different periods as Friendly (2006) broadly divided into the theoretical and technical aspects of data visualization. These five periods in news reporting: the early pioneers in the news, the rise of data chart and maps, pictorial turn, first computer age: graphics, the second computer age: interactives and third computer age: geek takeover (Cairo, 2017).

In the first period which states use of data visualization by early news pioneers, there were only hand-crafted data visualization works which are practiced by Daily Courant (Tascon, 2011 cited

in Cairo, 2017) and the initial use of data by the Guardian in 1821 (Rogers, 2011; Rogers and Gallagher, 2013). That's why before the 19th century transforming abstract data to graphical format was labor-intensive (Monmonier, 1989 cited in Cairo, 2017).

The second period is the rise of data charts and maps in news reporting in the 19th century which was the same era Friendly (2006) noted that golden age of statistical graphics (Cairo, 2017). While in 19th-century open news ways of graphical techniques and innovations, the second half of the 19th-century production of illustration – driven data visualization boosted (Burnhurst, Nerone, 2001 cited in Cairo, 2017). However, this development did not last long, According to Friendly (2006) with the turn of 20th century the acceleration of data visualization in statistics and science began to decrease, but Cairo (2017) disagrees that despite Friendly's (2006) call of modern dark ages for the first half of the 20th century, there are new developments in pictorial representation of data. This is the third period in the history of data visualization.

The fourth period of the data visualization in news reporting began with utilization computer-assisted reporting in the newsroom (Cairo, 2017). Of course, it is related with the use of computing technologies and According to Cox (2000), the first computer-assisted reporting had been done in 1952 to predict the presidential election in the US. According to Cairo (2017) utilization of the computer in the newsroom is a turning point for the graphical representation of data due to the fact that technological developments in graphic design through computing technologies change ways of data visualization crafts. These technological breakthroughs were Apple's Macintosh operating system and its features that support vector graphics and Adobe applications that make creation graphics easier and faster and more efficient (Cairo, 2017). Similarly, the second half of 20th century s highlighted by Friendly (2006) as a rebirth of data visualization, which is that data visualization gains prominence with the advent of computing technologies.

The fifth period of data visualization in news reporting is the second computer age: interactives which are pointed out by Cairo (2017) and it includes the time span from 1995 to 2005 which it can be said that it is related with the emergence of the digital newsroom (Cairo, 2017). In this case, not only contents in news reporting but also the staff members and indirectly the newsroom dynamics have changed due to the shifts from print-oriented publishing to the online and digital platform (Cairo, 2017). Also, the transformation of the news graphics has driven by the technological innovation with the launch of new iPad and iPhone that does not support flash applications paves the way for JavaScript language to be used to create interactive elements in publishing (Cairo, 2017; Kayser-Bril, Valeeva and Radchenko, 2016). Thanks to this

developers, programmers and web designers started to be hired by the news agencies. Also, this facilitated the rise of interaction data visualization in digital news media, such as D3 (Data Driven Documents) is an example of JavaScript library that enables animation, interaction in data visualization via the code instead of third-party applications like Flash (Bostock, Ogievetsky and Heer, 2011).

The sixth period of the data visualization Cairo (2017) pinpoints is based on the domination of programmers, developers and data-savvy designers in newsrooms owing to the ubiquity of data and change in the definition of work within the newsroom dynamics. By highlighting the change in newsroom dynamics and job description what Cairo (2017) means is that traditional division of labor which occurs in the separate news departments (designers, editors, etc.) in news reporting has blurred and shifted to data and visual teams and media professionals that have cross data and coding skills to gather, clean, analyze and visualize data with the advent of the digital technologies. Furthermore, aside from the change in the mindset, there are also interactive, animated, vibrant data visualization practices powered by the code-based applications. ProPublica's news applications[2] that enable readers to explore data and get insights from it or NPR's visual works (Cairo, 2017; Gray, Bounegru, and Chambers, 2012) and New York Times[3] and Guardian[4] 's interactive data visualization works[5] can be very good examples for this matter.

All in all, while Cairo asserts that 90s and millenniums saw illustration-driven data visualizations which are sometimes supported by small-scale data graphics and maps, recently this has changed and mostly visual representation of data from present-oriented perspective began to be preferred due to the fact that accessibility to the large scale of data and the advent of the computing technologies to make sense of it (Cairo, 2017). It can be easily said that naturally this has impacted the news contents and news departments too and today's news trends based on quantitative and data-oriented journalism emerged and subsequently data visualization gain the attention of the news publishers. For that reason, data visualization has been perceived as a specialized and valuable skill in many newsrooms in the USA and Europe (Rogers, Schwabish, and Bowers, 2017). Also, the current searching trends prove the growing significance of data visualization (Chart 1).

[2] https://www.propublica.org/newsapps/
[3] NYT: Upshot https://www.nytimes.com/section/upshot
[4] Guardian Data Blog https://www.theguardian.com/data
[5] NYT and Guardian's collection of data visualization http://collection.marijerooze.nl/

In addition, even though Cairo emphasizes the role of data and data-driven journalism on data visualization, data journalism must be addressed in the next section of this study properly in order to understand the impact of quantitative turn of journalism (Petre, 2013; Coddington, 2015) on data visualization crafts.

# 3. QUANTITATIVE TURN OF NEWS REPORTING: DATA JOURNALISM

## 3.1 WHAT IS DATA JOURNALISM?

The term of data journalism has different definitions were pointed out by journalists and scholars (Stray, 2011; Gray, Chambers and Bounegru, 2012; Howard, 2014; Kayser-Brill, 2015). Most of the definitions related to the importance of the news story but there are also definitions that emphasize the important steps in this new trend of news reporting. Bradshaw (2012) defines data journalism by saying doing journalism with data does not mean much, and he describes that data journalism is the converging the traditional way of news reporting with the ability to covering the story with the large range of data available today. Similarly, Rogers states that "data journalism is still about telling story best way possible, and it is just journalism" (Rogers, 2011). While Stray (2011) differently defines that "data journalism is obtaining, reporting on, curating and publishing data in the public interest", whereas Kayser-Brill (2015) questions the characteristics of data in news reporting by arguing that doing journalism with data does not define data journalism and also, he insists that a particular feature of data journalism is to do news reporting with structured data. Furthermore, a holistic definition comes from Aron Pilhofer:

> Data journalism is an umbrella term that, to my mind, encompasses an ever-growing set of tools, techniques, and approaches to storytelling. It can include everything from traditional computer-assisted reporting (using data as a "source") to the most cutting-edge data visualization and news applications (Gray, Chambers and Bounegru, 2012, p. 6)

As can be seen in the definition use of data visualization in data journalism is also exemplified via the use of news applications and data visualization as storytelling methods (Gray, Chambers and Bounegru, 2012). Similar to the Stray's (2011) definition Howard (Howard, 2014, p. 4) describe data journalism as "…gathering, cleaning, organizing, analyzing, visualizing, and publishing data to support the creation of acts of journalism". But he also describes the term of data journalism simply by arguing" the application of data science to journalism, where data science is defined as the study of the extraction of knowledge from data" (Howard, 2014, p. 4). As a result, these are the definitions of data journalism that were pointed out by journalists who practice data-driven news reporting and scholars who study the current trend.

Although there are different definitions for data journalism, the trend has already found itself a place in journalism literature via news media reports (Howards, 2014; Rogers, Schwabish, and Bowers, 2017), case studies (Parasie and Dagirel, 2013; Appelgren and Nygren, 2014; De Maeyer et al., 2015; Karlsen and Stavelin, 2014; Fink and Anderson, 2015; Borges-Rey, 2016)

and academic and research papers (Lewis and Westlund, 2014; Coddington, 2015; Figl, 2017; Young, Hermida and Fulda, 2017) in previous years. Of course, these developments come with the news media's inclinations towards data-driven news reporting, for example, Guardian Data Blog[6], New York Times's UpShot[7], Five Thirty-Eight[8], ProPublica[9], LA Times Data Desk[10], De Zeit[11], Washington Post Wonkblog[12] (Rogers, Schwabish, and Bowers, 2017)

In addition, according to latest Google News Lab's report on data journalism, "data journalism has become more mainstream than any other time in the history" (Rogers, Schwabish and Bowers, 2017). Also, the report supports this argument with the finding which is that 42% of journalists use data regularly to tell stories, and more than half of the newsrooms have a dedicated data reporter on staff (Rogers, Schwabish and Bowers, 2017).

### 3.2 DEVELOPMENTS OF DATA JOURNALISM

Despite fact that data journalism is seen as an emerging form of news reporting with a mixture of data analyses and visualizations (Appelgren and Nygren, 2014; Gray, Bounegru, and Chambers, 2012), reporting and working with data have a deep historical background (Bounegru, 2012) and also it may be since the first journalistic practices (Howard, 2014). For instance, Guardian former data editor Simon Rogers states that the earliest example of data journalism at Guardian was in 1821 and it is a data table that shows a number of students who were in school and the costs per school in Manchester (Bounegru, 2012). Also, Howard (2014) stresses the same argument that statistics began to be used in news reporting as Guardian did in the 19th century and financial stock market data also had been published by Dow Jones & Company in Wall Street Journal before the financial market data went digital. Moreover, Liliana Bounegru (2012) points out that most relevant example of data journalism came from computer-assisted reporting (CAR) that was the first systematic way to collect and analyze data with computers in order to improve the news coverage. While the first example of CAR was in 1952 to predict presidential election' result (Cox, 2000), in the 1970s Meyer's precision journalism term was used to describe this way of news reporting, which is based on the use of social science methods in journalism (Coddington, 2015). By the end of the 20th century, CAR

[6] https://www.theguardian.com/data
[7] https://www.nytimes.com/section/upshot
[8] http://fivethirtyeight.com/
[9] https://www.propublica.org/
[10] http://www.latimes.com/local/datadesk/
[11] http://www.zeit.de/datenjournalismus
[12] https://www.washingtonpost.com/news/wonk/?utm_term=.722eb39f09fd

was used in mainly investigative reporting projects because newly employed microcomputers and computing technologies facilitate more powerful scrutiny on official statistics and so that computer facilitated comprehensive investigative journalism practices (Howard, 2014, p. 9).

On the other hand, Howard (2014) accepts that the term of computer-assisted journalism is outdated in the 21st century since computers are not an innovation in the newsroom anymore, ability to use computers in news agencies are the necessity rather than sophisticated skill that a few reporters had in the past. Also, he acknowledges that web technologies that enable journalists to employ data journalism processes (scraping, cleaning, visualizing etc.) on raw data for journalistic purposes, growing open data movement and collaboration in the newsroom are the unique characteristics of data journalism compare to the computer-assisted reporting (Howard, 2014). Similarly, while Bounegru (2012) points out there is a "continuity and change debate" about naming journalism that employs computer techniques on news reporting, she distinguishes data journalism from computer-assisted reporting by arguing data journalism focuses on data itself in all journalism processes rather than just uses it to enrich investigative reporting as computer-assisted journalism did. Though there are two communities argue about the labelling this new quest of journalism, Bounegru (2012), who tries to reconcile the turf war upon the terminological debate, states that it is not useful to argue about what is data journalism or not, instead assuming data journalism part of the previous journalism trends would be more suitable stance because the most media practices have also historical bonds with former one. Also, she asserts that even though data journalism is new kinds of journalism uses cutting-edge web technologies, it may benefit from the critical approach and experiences of computer assisting reporting (Bounegru, 2012).

Furthermore, the discussion about labeling quantitative turn of the journalism may continue in academic papers while it seems that the term of data journalism was started to use widely in US and European newsrooms aftermath of WikiLeaks and its coverage by Guardian, New York Times and Der Spiegel (Bounegru, 2012). Nowadays data journalism is a mainstream term and popular practice and even if it is very widespread in the US and Europe (Heravi, 2017), this trend also has effects on small newsrooms in other parts of the world, La Nacion in Argentina (Mazotte, 2017), Swiss daily Neue Zürcher Zeitung, the US South Florida Sun-Sentinel, or the Ukrainian Texty (Splendore et al. 2015). Also, data journalism practice has its own awards in journalism industry which is also evidence of the pervasiveness of data journalism that can be seen in submissions from different countries to Data Journalism Awards[13] that is arranged by

[13] https://www.datajournalismawards.org/past-winners/

Global Editors Network. There are also networks such as European Data Journalism Networks[14], Data Journalism DEN[15] that support and promote data journalism and data-driven reporters.

Aside from the number of news media that aims data journalism practices, there are studies that reflect benefits of data journalism in terms of both quantity and quality for news media nowadays. According to the global data journalism survey (n = 181 respondents from 43 countries) that were conducted between 3rd December 2016 and 1oth May 2017, 46 % percent of the participants said they have data-driven teams or blogs or desks in their news media (Heravi, 2017). Also, while 65 % of the respondents answered that data journalism facilitates them to produce more news stories, 91 % of them notes data journalism improves the news reporting in their media organizations and along with this 70 % of participants told that they cannot do their work without using as a source (Heravi, 2017).

Moreover, data journalism fosters the democratization of data, tools, methodologies that are used by scientists, experts for the news-making and also data journalist plays the role to bring down the barrier of data literacy of the readers (Bounegru, 2012). Using these tools and methodologies to cover stories may seem as a challenging for newsrooms that might not have the required resources or staff, Figl (2018) disagrees. She points out that data journalism is a team support and small newsrooms have several advantages: better communication, easy to collaborate and experiment and fast transition to data reporting (Figl, 2018). Thus, data journalism may not be the work of large newsrooms and small-scale newsrooms can practice it

### 3.3 DATA JOURNALISM IN TURKEY

As it does impact many newsrooms in many countries data journalism as a rising trend in new reporting has impacted newsrooms in Turkey too. Currently, small newsrooms and investigative reporting projects have used quantitative ways to make sense of data for journalistic purposes. Dağ Medya's Deceased Workers Database[16], Bianet's compile of human rights violations[17], Femicide Map in Turkey[18], Networks of Dispossessions[19] and Last Ten Years of Imam Hatip Schools[20] projects are some of the data journalism practices in Turkey. Although newsrooms in Turkey do not work with data to publish stories regularly, especially

[14] https://www.europeandatajournalism.eu/eng
[15] https://datajournalismden.org/
[16] https://dagmedya.net/2014/09/02/turkiyede-madenciligin-acik-veritabani-projesi-tamamlandi/
[17] http://bianet.org/bianet/ifade-ozgurlugu/119085-bia-medya-gozlem-raporlari
[18] http://kadincinayetleri.org/
[19] http://mulksuzlestirme.org/index.en/
[20] https://dagmedya.net/imamhatipliseleri/

Dag Media, Birgün.net, BBC Türkçe, Evrensel.net, Anadolu Agency, Bianet.org, Al Jazeera Turk, Sol.org and 140 Journos are among the few newsrooms that use data journalism practices to enrich their news reporting in Turkey. Some of these newsrooms use only data visualization or data charts that support their weekly news stories while others do investigative reporting and dig up stories in official statistics or their own compile of raw data. For example, Anadolu Agency, Sol.org, Birgün, Al Jazeera Turk, Dag Media have their interactive or infographic pages or blogs to publish their data-driven stories while BBC Türkçe, Evrensel, 140 Journos use data related contents in their reporting without compiling in some page or blogs. However, data visualizations are seen in the daily news rather than investigative reporting in Turkey because investigative data journalism is very scarce (Smith, 2018). Pınar Dag, data journalism instructor and data journalist in Turkey, points out that although there are free and open sourced data visualization and data analysis tools that are available for everyone, compared to the newsrooms in the US, Europe, and Asia, Turkish news media fell behind on the use of data visualization and data-driven reporting (Smith, 2018). Also, she stresses that number applicants to Global Data Journalism Awards from Turkey is rare and the quality of works is limited to the datasets that were published by the official statistical agency (Smith, 2018).

# 4. NEWS MEDIA LANDSCAPE IN TURKEY

So far data visualization and data journalism have been defined and historical developments of both disciplines have been pointed out by citing certain scholars, literature and reports. Due to the fact that one of the purposes of this study is the identifying challenges Turkey's news media face in use of data visualization, it is clearly related with news media landscape, its structures and political and economic conditions in Turkey. Therefore, in order to evaluate the situation correctly, transformation from traditional newspaper to digital news portals, current state of news media, existing revenue generating business models, structures of media organizations and political state of the country regarding the freedom of expression and freedom of the press must be addressed because these aspects have effects on application of new practices in news reporting directly or indirectly.

## 4.1 FROM PRINTING PRESS TO DIGITAL JOURNALISM

The printing press that was first seen in the 17th century of Europe, was not introduced until the first half of the 19th century in Turkey which was then under the rule of the Ottoman Empire (Tokgöz, 2000). Since then Turkish media has been under the influence of state control, but after the World War Two, with the advent of new printing technologies, news media thrived in Turkey (Tokgöz, 2000). In the period between the 1950s and 1970s, the press changed its shell owing to the fact that newspapers became a lucrative business and this transformed the news media ownership from journalist families to media owners (Tokgöz, 2000). While top management of news media in Turkey began to change, in the 90s a new revolutionary technology, the Internet impacted communication and publishing sectors and became the new medium of communication with incomparable pace to the previous technical developments (Çevikel, 2004). While Turkey's internet connection established through the collaboration with METU and TUBITAK under the framework of State Planning Organization in 1993 (Gürcan, 1998), printing press and magazines in Turkey kept up with technological innovation and launched their digital news portals after the mid-90s. Although there are some inconsistencies about the first news media that open its digital news websites, it is accepted that Zaman Daily was the first newspaper published its contents online and the first online news portal was XN (Eksen) which was dedicated to compiling daily news from traditional newspapers and also Aktuel Magazine became the first to publish its issues online in 1995 (Gürcan 1998; Karaduman, 2002; Çevikel, 2004; Çakır, 2007). Then these developments were followed by digital news portals of other national dailies and magazines such as Milliyet which was the first

daily that publishes all of its news contents, Hürriyet Daily, Sabah Daily, Radikal Daily and Cumhuriyet Daily (Gürcan, 1998; Karaduman, 2002).

Furthermore, the first digital shifts from the traditional newspaper to digital news sites have been carried out in the US with New York Times, Washington Post and in Europe with Herald Tribune and Daily Mirror in 1995 (Çakır, 2007). This transformation has been addressed as digital journalism in the literature and internet or online journalism in Turkey (Gürcan, 1998; Tokgöz, 2000; Karaduman, 2002). While online journalism or digital journalism is the informing public by using the journalistic methods via web technologies (Karaduman, 2002), these new technologies paved the way for use of multimedia contents, audio, visual, text and images in journalism and change one way of traditional communication mentality (Tokgöz, 2000). Moreover, Tokgöz (2000) asserts that this digital shift created a distinction between traditional journalism and online journalism and it can be explained with three different time periods. In the first period news was produced to publish on newspapers but it was edited and optimized to republish on the digital portals, while news reporters produce digital oriented news contents for digital news portals in the second period (Tokgöz, 2000, p. 90). The third period is the basis not only consuming news by reading but also interacting with it by surfing on the news thanks to new storytelling technologies (Tokgöz, 2000). Similarly, Karaduman (2002) applies these three periods to developments of digital journalism in Turkey and he claims that as of 1997 newsrooms began to report stories in a suitable and up-to-date format for digital news portals.

On the other hand, despite the fact that there are assumptions that these new technological innovations empower journalism and open new ways to do quality news reporting due to the low cost of online news portals and emancipatory structure of the internet (Atabek, 2003, Karaduman, 2002; 2003; Çakır, 2007), traditional mainstream news media organizations were more advantageous on adapting its services to digital ecosystem than small-scale news media in terms of technical and financial aspects (Çevikel, 2004). While newly established internet market attracted more players from out of news media ecosystem such as internet service providers to launch news portals which were Doğan Online, Super Online, Ihlas-net to sell internet subscriptions, existing mainstream media agencies also do not tend to miss the opportunity to invest a new market that may reduce their advertising share in the near future (Çevikel, 2004). Also, traditional media organizations have commercial motive to expand their service segmentations via the internet, whereas small-scale newsrooms and digital first newsrooms face financial, technical and sector-based challenges because of lack of public policy that regulates the internet, insecure and poor revenue generation, lack of internet

penetration and dependence to the traditional news sources (Çevikel, 2004). Even though, more than ten years has passed since Çevikel's point, in my opinion some of the challenges are still the valid and barrier to the free and independent media landscape

## 4.2 CURRENT STATE OF THE NEWS MEDIA

As can be seen in the transition period from traditional media to digital media outlets news media landscape had been impacted by many factors. Although scholars claim about three periods of time to explain the change (Tokgöz, 2000; Karaduman, 2002), there were new phases that alter the news media landscape in both Turkey and the world until the current state of media outlets today (Skok, 2017). In this regard, Skok (2017) proposes four different periods to specify the certain timescale of digital journalism: the portal era (1990-1997), the search era (1997 -2006), the social era (2006 – 2015) and the SaaS era (2015 – Present day). The first era was based on news portal launches of the MSN, AOL, and Yahoo (Skok, 2017) which was similar to the ISP's news portal launches to sell internet subscriptions in Turkey (Çevikel, 2004). The second era is based on attracting user traffic from Google through search engine optimizations to maximize the profit (Skok, 2017). But with the advent of social media, a new period began for digital journalism and this era was based on optimizing news contents for social networks such as Facebook, Twitter, and Snapchats (Skok, 2017). Lastly, a new period, SaaS (Stories as a Service) that is the basis of reader's financial supports for newsrooms has been newly debated (Skok, 2017). If this model was applied to digital shifts of news media in Turkey, newsrooms in Turkey are still in the third era which is the social media phase. Currently, many newsrooms such as 140 Journos, BBC Türkçe, Yenişafak, Sözcü, Hürriyet focus on social media and produce optimized contents for the audience in social platforms. This is not the say that SaaS era does not impact news media landscape in Turkey. There are some cases that digital civil society initiatives demand support from its readers such as Doğruluk Payı's Amplify the Truth's Voice campaign and small news media outlets such as T24 and Medyascope's asking donations from their audiences as Guardian does (Akbulut, 2018; Davies, 2018).

In addition, there are quantitative studies that reflect the state of news media in Turkey. The first one is the official press statistics in 2016 from Turkish Statistical Institute. It reveals that the number of newspapers and magazines decreased by 7.9 percent from 2015 to 2016 while annual circulation also fell by 20 percent during the same period (Yazılı Medya İstatistikleri, 2017). The second one Reuters Digital News Report in 2017 and related supplementary report

focuses on the state of digital and traditional news media in Turkey comprehensively (Yanatma, 2017a; 2017b). According to Digital News Report in 2017, the biggest digital news portals are still the online websites of mainstream media such as Hürriyet, Milliyet and CNN Türk web portals (Yanatma, 2017b) despite the fact that the first digital websites were launched 22 years ago. However mainstream media in Turkey began to lose their monopoly in weekly use to small-scale online newsrooms such as Oda Tv, T24, Diken, Bianet which started to grow gradually (Yanatma, 2017b). Because of the fact that Turkish audience rarely pays for news, online news portals significantly depends on advertising (Yanatma, 2016) few of the small-scale independent newsrooms try to survive in these conditions (Yanatma, 2017a), but these online news sites also face government censorships and blocks and they may lose only income sources which are the number of visitors and advertising (Tunç, 2015), Also, there are digital born news websites that try to do quality journalism and some of them are Duvar, Karınca, Webiztv, Özgürüz, 140 Journos that is dedicated to doing citizen journalism and Journo that aims to fund freelance and unemployed reporters with human rights funds and create hub for media professionals (Yanatma, 2017a).

Moreover, according to supplementary report of news media in Turkey there are paradoxical and contradictory findings, for example level of trust with 40% and distrust 38% in news media is close each other while news interest is at the peak with 81 % and surprisingly more than half of the respondents (57%) avoid news contents (Yanatma, 2017a). Yanatma (2017a) claims that these findings illustrate that Turkish people highly polarized in accordance with the news media. News consumers in Turkey rely on online sources (including social media) with 89%, TV with 77%, newspaper 47% in weekly use whereas TV s the at the top of the list in main news sources with 47 percent and online media outlets along with social media follow along with 39 percent (Yanatma, 2017a).

### 4.3 BUSINESS MODEL OF NEWS MEDIA

News media in Turkey depends on advertising revenue to survive because of the fact that revenues from sales do not cover the cost of running news media business (Yanatma, 2016). According to Reuters Digital Media Report in 2017, there are subscription-based business models that were tried by Birgün Daily, Evrensel, T24, and Düşünce but the majority of the media outlets needs advertising to maintain their publishing or broadcasting (Yanatma, 2017b). There are a few newsrooms that are alternatively funded rather than advertising revenue, such as Bianet which is the alternative digital newsroom that focuses on the right based journalism

and it is funded by IPS foundation[21]. Another example is the 140 Journos, a digital first news portal that practices citizen journalism[22].

The Digital News Report 2017 reflects that even though advertising revenue in print newspaper decreased, online advertising continued to grow in 2016 (Yanatma, 2017b). However, media financing through advertising in Turkey is not transparent and there is only handful of data according to Media Integrity Report of Media Observatory (Tunç, 2015). Also, there is little prospect for critical publications due to the government's efforts to block the website and cut off their funding (Yanatma, 2017b).

Moreover, advertising is the main source of income for media organizations in Turkey comes from only private organizations and public institutions which most announcements are distributed by Press Bulletin Authority (Basın İlan Kurumu) (Yanatma, 2016). According to Yanatma (2016), official advertisements decisions that are allocated by Press Bulletin Authority are political due to the fact that the agency uses the official announcement as a stick and carrot for political reasons in order to prevent critical media outlets to thrive. Yanatma (2016) also argues that government controls one-fifth of the private advertising with the help of the state-appointed executive boards to Turkish Airlines, Türk Telekom, and Turkcell. While the number of advertisements increased in political Islamist newspapers, advertising share of opposition media declined (Yanatma, 2016). As can be said that the ruling party uses advertising instrument to silence critical or opposition media organizations and thrive its mouthpiece, pro-government newspapers.

Furthermore, advertising market has yet to be adapted for online news media outlets and it is not still at desirable level to fund digital news media. Atakan Sönmez, editor in chief from Cumhuriyet.com.tr states that the online journalism has still no solid financial ground, because of two reasons; one is that even though there is a rapid growth in the incomes of news media, internet and digital news portals can't get enough share from it and the second is that media executives do not consider the investment in the internet as a priority (Şenyüz, 2018). Kerem Çalışkan, the founder of NTVMSNBC, approaches the subject from political perspective and asserts that online journalism in Turkey has not reached the deserved advertising and financial support due to the critical stance of online news portals and the intimidations of the ruling party (Şenyüz, 2018). Similarly, Ümit Alan, a columnist from Birgün daily, points out that journalism do not make money because it is very costly to do but you are offering this service free of charge and if you close the doors, set a paywall, nobody will tend to pay for it (Şenyüz, 2018).

[21] http://bianet.org/bianet/sayfa/ips-iletisim-vakfi
[22] https://enstitu.com.tr/140journos-5db9711ae24c

## 4.4 MEDIA OWNERSHIP IN TURKEY

Media in Turkey has been founded and managed by intellectuals since the first newspapers during the Ottoman Empire (Sözeri 2015). After the collapse of Ottoman Empire and the born of Republican Turkey, media was used to spread republican and reformist values and trends. Therefore, media ownership has been around since the late Ottoman era and the born of modern Turkish republic (Sözeri, 2015).

In Turkey, media ownership is used to conserve and empower owners' businesses in different sectors. Also, as Sözeri (2015) argues it is an opportunity to build a beneficial relationship with the ruling party and receive public tenders in different business sectors. In addition, there are strong business ties and political affiliations between media owners and government in Turkey. According to Sözeri (2015) and Bianet and Reporters Without Borders' "Media Ownership Monitor Turkey[23]" study during the Ak Party ruling since 2002, some of the media organizations such as Albayrak Group, Kalyon Group, Ihlas Group, Doğuş Group and Es Media Group have been grown dramatically. These business companies have media organizations that broadcast TV programs and publish newspapers for at least 40 percent of the audience in Turkey (Media Ownership Monitor Turkey, 2016). Also, media ownership networks of business companies in Turkey can be seen easily in the study of Network of Dispossession.

Another similar study was carried out by Bianet and Reporters Without Borders to monitor media ownership in Turkey draws same conclusions about business interests between media and political elite and news media's political affiliations (Media Ownership Monitor Turkey, 2016). According to the study, one of the most important insights is media organizations who have political ties with the ruling party hold 53 percent of TV, 44 percent of the news portal, 57 percent of newspaper and 39 percent of radio broadcasting audience shares in Turkey. The most circulated 7 out of 10 newspapers are owned by business people that are politically affiliated (Media Ownership Monitor Turkey, 2016).

## 4.5 PRESS FREEDOM IN TURKEY

Turkey has been governed under the state of emergency after the failed coup attempt on July 15th. Therefore, current political state of the country is not the very suitable condition to press freedom and freedom of speech. According to Media Ownerships Monitor Turkey study[24], the

[23] https://turkey.mom-rsf.org/en/findings/business-interests/
[24] https://turkey.mom-rsf.org/en/findings/shutdown-media/

aftermath of the coup attempts 5 news agencies, 62 newspapers, 19 magazines, 34 radio station, 29 TV channels and 29 publishing houses have been shut down by decree laws under the Marshall Law. Also, 620 press accreditations have been canceled with decree-laws (Media Ownership Monitor Turkey, 2016). As can be clear to say that journalists and media professionals have been silenced by the help of the state of emergency and its elements to control the media through decree laws.

According to Committee to Protect Journalists[25], Turkey is one of the world's worst journalist jailers with China and Egypt and 73 journalists in Turkey are behind bars (Beiser, 2017), while 145 media workers and reporters are in jail that is reported by Turkish Journalists Association[26]. Majority of the journalists face anti-government or coup attempt charges under the anti-terror law that encompasses journalistic activities that may be a threat to state's national security (Beiser, 2017). However, as Sözeri (2015) argues that there were many journalists and media workers that had been charged because of the insult and assault on personality rights of the government officials before the state of emergency, even journalists' tweets could be the reason to be detained.

In addition, it can be seen from press freedom watchdog organizations' reports that Turkey has been at a new low in press freedom. Both Freedom House[27] and Reporters Without Borders (RSF)[28] positioned media in Turkey as "not free" in 2017, whereas Turkey was ranked 155th out of 180 countries in RSF's Press Freedom Index. Similarly, Turkey is not free in internet freedom report of Freedom House in 2017 too[29].

Aside from the reports, news media in Turkey faces gag orders[30] that are issued by courts[31] and URL-based internet blocks and bans to control flows of content on the internet and news media[32]. One of the notorious banned websites is the Wikipedia[33]. Similarly, Sendika.org had been banned 62 times and it uses an URL address that shows how many times does it banned by Turkey[34]. Moreover, internet ban may go from throttling, slowing down the internet or completely blacking out internet networks in a region[35]. Thus, the government has controls on

[25] https://cpj.org/reports/2017/12/journalists-prison-jail-record-number-turkey-china-egypt.php
[26] https://tgs.org.tr/cezaevindeki-gazeteciler/
[27] https://freedomhouse.org/report/freedom-press/freedom-press-2017
[28] https://rsf.org/en/ranking
[29] https://freedomhouse.org/report/freedom-net/freedom-net-2017
[30] https://www.huffingtonpost.com/entry/turkey-media-blackout-istanbul-bombing_us_56957080e4b086bc1cd5a364
[31] http://www.aljazeera.com.tr/haber/rtuk-yayin-yasaklarini-genisletti
[32] http://platform24.org/guncel/839/-oto-sansur-testinden-kac-aldik
[33] https://turkeyblocks.org/2017/04/29/wikipedia-blocked-turkey/
[34] http://sendika62.org/
[35] https://turkeyblocks.org/2016/10/27/new-internet-shutdown-turkey-southeast-offline-diyarbakir-unrest/

web contents and website and URL-based ban prevent Turkish internet users to visit the site and see the contents unless they use VPN or any other tools to overcome government's censorships and blocks.

All in all, even though news media met with the internet approximately 30 years ago, news media landscape is still dominated by traditional news media and its digital portals in Turkey as Reuters Digital News Report 2017 reveals. Although, there are also new digital news media initiatives that try to innovate the news reporting, they have to face the significant challenges such as lack of reliable business model for editorial and financial independence, political influence on public and private advertising, media concentration and ownership and current political state of the country regarding the freedom of press in Turkey. However, there is also a bright side of the current media landscape such as digital oriented young reader profiles, growing demand for online news sources (including social media networks) and increasing rate of investment for digital advertising and current experiments and debates about crowdfunding news media. As a result, there is no doubt that these challenges, pitfalls, and opportunities in news media landscape may impact the investment decisions for news practices like data journalism and subsequently use of data visualization in Turkey.

# 5. MONITORING USE OF DATA VISUALIZATION IN NEWS REPORTING IN TURKEY

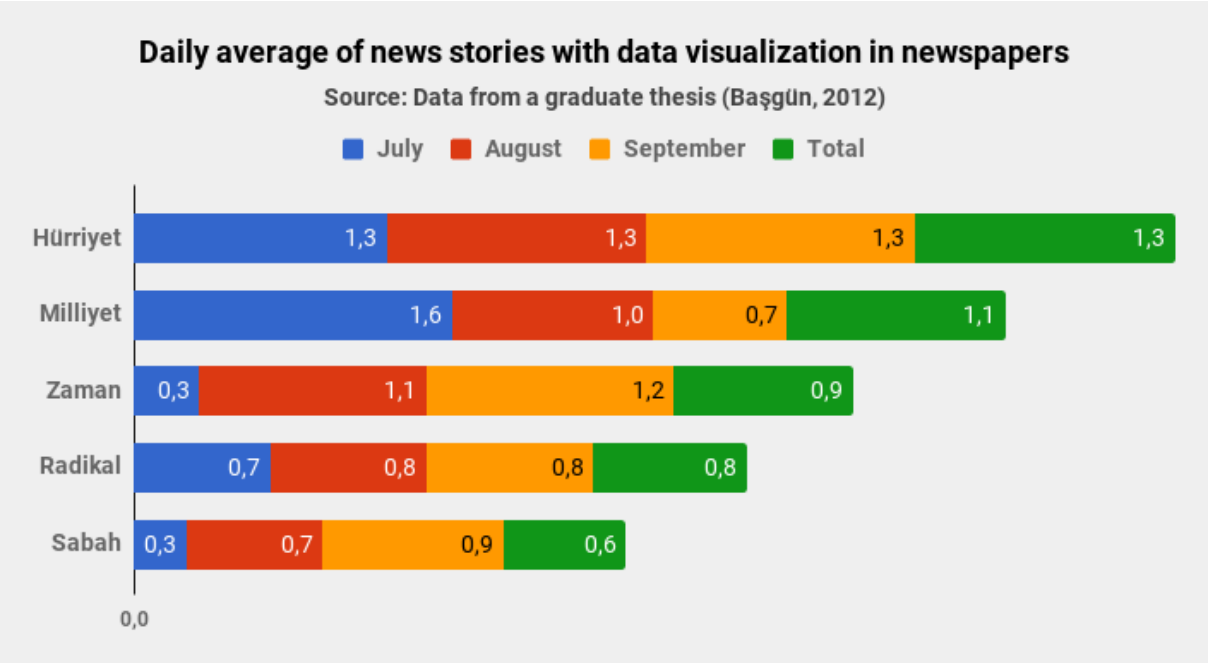
## 5.1 QUANTITATIVE CONTENT ANALYSIS

The content analysis is to reveal the current use of data visualization in digital news media portals and newspapers in Turkey. For this study five newspapers five digital news media websites were monitored for 3 weeks. After that compiled datasets were analyzed under the four parameters: daily average of news stories with data visualization, distribution of news stories with data visualization per news category, distribution of visualization techniques that were used in news report, use of data sources in news stories. These four parameters were specified to reveal daily frequency of media coverage with data, which categories have more media coverage with data visualization, selection of data visualization methods and which data sources news media outlets used to create data driven news contents. Then the results from newspapers and digital news portals compared with each other and also with a previous study (Başgün, 2012) that used more or less same methodology to study the data visualization in Turkey' news media.

## 5.2 A SIMILAR STUDY IN THE LITERATURE

While some of the studies in Turkey covered the data visualization and infographics from graphical design perspective (Güler, 2008; Kırlı, 2009), there is one study that examined the use of information graphics in five national newspapers that are Hürriyet, Milliyet, Zaman, Radikal, Sabah (Başgün, 2012). Even though the study included only print newspapers, its methodology is more or less similar to this research's methodology. The researcher monitored five national dailies for three months between July 2012 and September 2012 while news reports were categorized in five different aspects which were agenda, economy, headline, sport and other (Başgün, 2012). Similarly, the researcher analyzed the percentages of news reports and their categorical distribution per newspapers (Başgün, 2012).

**Chart 5.1:** Daily average of news stories with data visualization in newspapers (data from Başgün (2012, pp. 60-72))




First of all, as can be seen in Chart 5.1 if the three months coverage of national dailies were aggregated and divided by number of days (92), daily average of number published news reports with data visualization is lower than one per day in Zaman, Radikal, Sabah dailies while Hürriyet and Milliyet dailies published one news reports with data-driven contents per day. Also, Chart 5.1 illustrates that frequency of news stories in four out of five newspapers that contain data visualization is not stable. Only Hürriyet produced the frequent amount of data visualization for three months. As a result, only the two out of five national newspapers produce one news reports with data visualization per day.

Second prominent findings from the study are that proportions of news reports per category are dominated by financial news nearly in three months and in all newspapers (Başgün, 2012).

**Table 5.1:** Percentage of the news stories with data visualization per category and newspaper (data source: Başgün (2012, pp. 60-72))

| **Percentage of the news stories per category and newspaper** | | | | | |
|---|---|---|---|---|---|
| **JULY (%)** | | | | | |
| **Newspaper** | **Economy** | Agenda | Headline | Sport | Other |
| **Hürriyet** | **17.9** | 0 | 76.2 | 0 | 5.1 |
| **Milliyet** | **67.3** | 24.4 | 2 | 0 | 6.1 |
| **Radikal** | **61,9** | 23.8 | 0 | 4.7 | 9.5 |
| **Sabah** | **87.5** | 12.5 | 0 | 0 | 0 |

| | | | | | |
|---|---|---|---|---|---|
| **Zaman** | **80** | 0 | 0 | 0 | 20 |
| **AUGUST (%)** | | | | | |
| **Newspaper** | **Economy** | Agenda | Headline | Sport | Other |
| **Hürriyet** | **77.5** | 20 | 0 | 0 | 2.5 |
| **Milliyet** | **58** | 19.3 | 9.6 | 9.6 | 3.2 |
| **Radikal** | **83.3** | 0 | 0 | 0 | 16.6 |
| **Sabah** | **80** | 4.7 | 0 | 0 | 14.2 |
| **Zaman** | **82.6** | 2.8 | 0 | 0 | 14.2 |
| **SEPTEMBER (%)** | | | | | |
| **Newspaper** | **Economy** | Agenda | Headline | Sport | Other |
| **Hürriyet** | **17.5** | 2.5 | 75 | 2.5 | 2.5 |
| **Milliyet** | **70** | 20 | 5 | 0 | 5 |
| **Radikal** | **0** | 76 | 4 | 0 | 20 |
| **Sabah** | **40.7** | 33.3 | 7.4 | 0 | 18.5 |
| **Zaman** | **88.8** | 3.7 | 0 | 0 | 7.4 |

As it is clearly demonstrated in Table 5.1 four out of five national dailies published news reports in economy-related issues in July 2012 while all of the newspaper's coverage was mainly dominated by financial matters in August 2012.

Similarly, the same findings can also be seen in September 2012 coverage of three out of five national dailies while compared to the other newspapers Hürriyet differs itself mainly by publishing its news stories in agenda and headline categories. Also unlike other four national dailies, distribution of news stories in categories are less lopsided. Başgün (2012) explains these results that the distribution of Hürriyet's news stories differs from other because Hürriyet daily published a story series as "The Number of Turkey" on its headline during the same period the study was carried out.

As a consequence, according to the study newspapers in Turkey predominantly published data-driven stories in economy pages and for this reason, mostly financial issues were covered with data visualization practices to make sense of complex datasets by newspapers. Also, the data that retrieved from the study revealed that quantity of news stories contains data visualization, information graphics or any data-driven related visualization per day is low and only 2 out of five national newspapers produce one news reports with data visualization per day. Lastly, despite fact that the methodology of the study is not same as the methodology of this

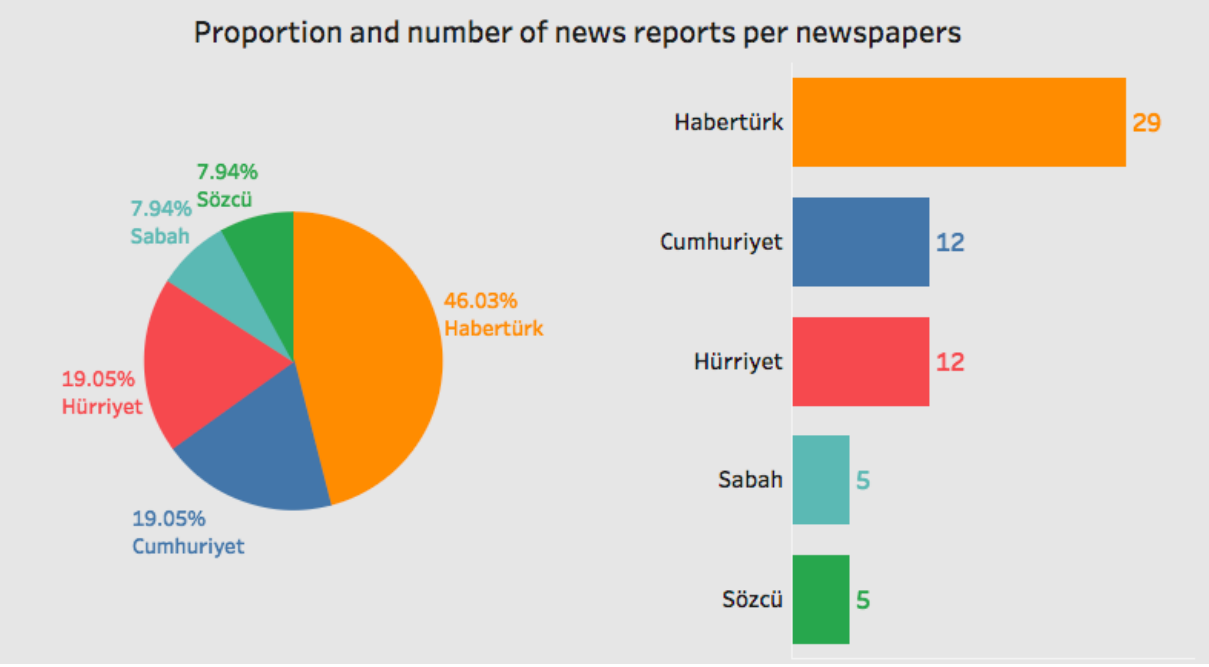
dissertation, it reflects valuable insights on the use of data visualization in five national newspapers which were most circulated ones when the study was conducted.

## 5.3 RESULTS AND INSIGHTS

### 5.3.1 Use of data visualization in newspapers

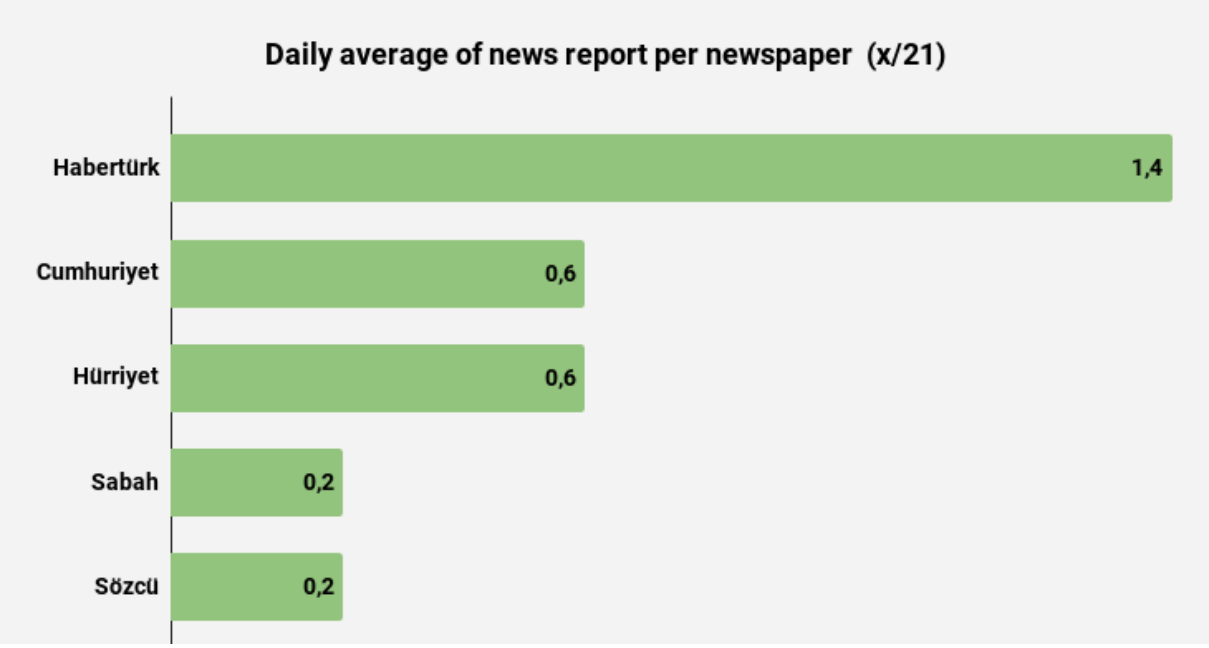
As it is explained that five national dailies such as Hürriyet, Habertürk, Sözcü, Cumhuriyet, and Sabah were picked to monitor the current use of data visualization for 3 weeks from 19th February 2018 to 11th March 2018. These newspapers produced 63 news stories with data visualization (charts, maps, infographics) in total. As can be illustrated in chart 5.2, 46 percent of the news reports were produced by Habertürk and Cumhuriyet and Hürriyet followed by 19 percent respectively. Sabah and Sözcü dailies published only by 7.9 % of news story within the three-week period. Since the percentage values were acquired the whole values, Habertürk clearly surpassed other four national newspapers in producing news stories with data visualizations.

**Chart 5.2:** The proportions and the number of news reports per newspaper



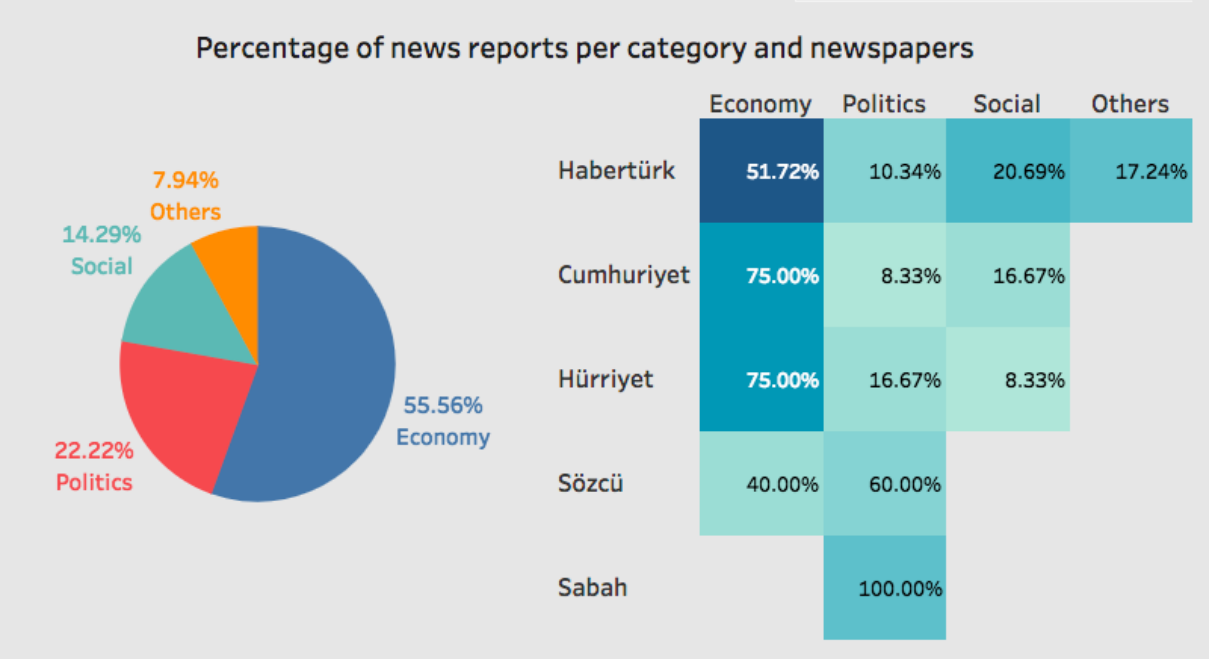

Moreover, if the number of news reports published in newspapers was divided by the number of days this study conducted, it can be found the daily average of news stories with data visualizations. When this calculation was carried out for this study, this reflects that Habertürk produced 1,4 news stories per day whereas Cumhuriyet and Hürriyet published 0.6 news reports and Sabah and Sözcü contributed the least daily average of news story per day in three weeks.

**Chart 5.3:** Daily average of news report with data visualization per newspaper



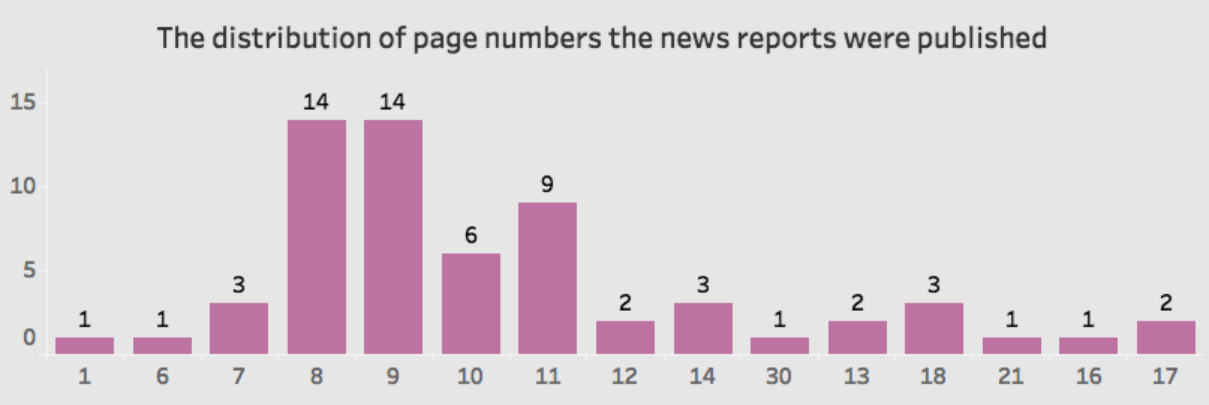

Another parameter in the study is the news categories that contain news stories in political, social, economic or other issues. As the chart 5.4 demonstrates that the largest proportions of news reports were produced in financial issues by 55.5 percent while politics related news stories are the second largest by 22.2 percent. These figures were followed by news reports in social matters by 14.2 percent and other topics by 7.9 percent of aggregated proportion respectively. These findings are similar to the Başgün's (2012) study which revealed that economy-related news stories were more frequent than the other categories in nearly all newspapers. The same trend can be seen when the values were distributed by news categories and newspapers. In that case, the right graph of the chart 5.4 reflects that three out of five national dailies produced news stories with data visualization in economy categories and these three newspapers produced the 84 percent of the news reports (chart 5.4). Thus, it can be said that almost six years later the trend of utilizing data visualization in financial matters in newspapers did not change at all.

**Chart 5.4:** The percentages of news report with data visualization per news category and newspaper



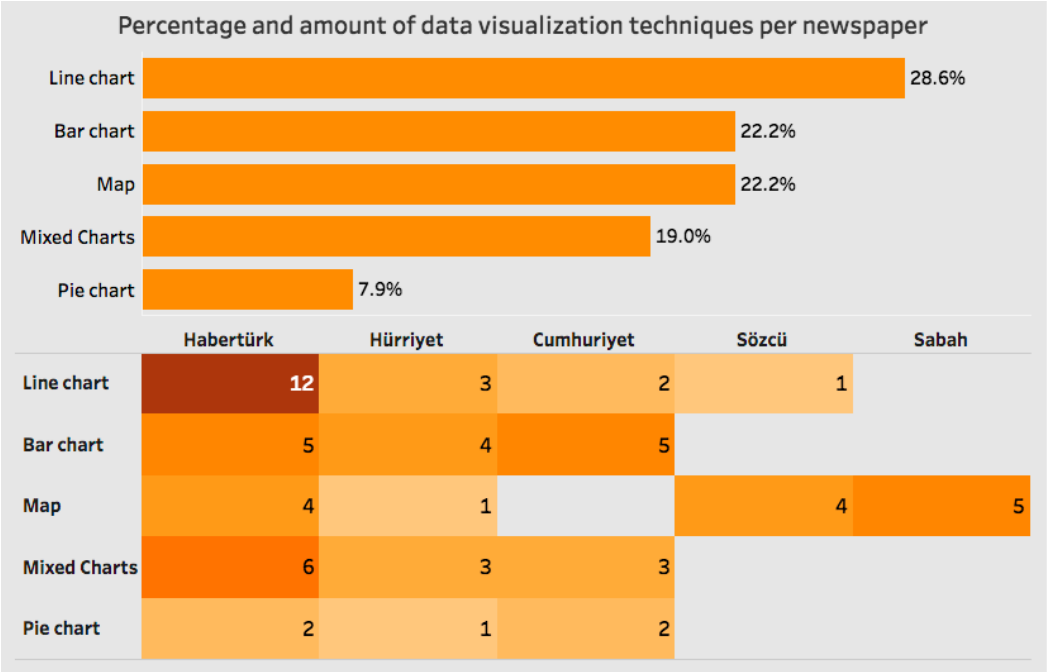

Unlike the previous study that was conducted by Başgün (2012) this study divided the news stories into politics, social and other categories. The chart 5.4 illustrated that newspapers published news with data visualization in politics and social categories even if these figures are less than the finance related news stories. Another interesting point is that while news stories were distributed somewhat balanced way, Cumhuriyet and Hürriyet published more news stories in economy categories in their terms and also the range in proportions between news categories in Hürriyet and Cumhuriyet is wider. Also, another finding is that newspapers published news stories in between 8th and 11th pages as can be seen in chart 5.5 and these pages contain economy related news. As a result, the number of news reports published by newspapers is more frequent in the economy category and the previous study's findings (Başgün, 2012) support that this trend is not new.

**Chart 5.5:** The distribution of page numbers news stories was published



Furthermore, the study sheds lights on the use of data visualization techniques in newspapers. As can be illustrated in chart 5.6, mostly line chart was preferred of all the data visualization techniques by 28.6 percent in published news stories. While bar chart and map techniques were

**Chart 5.6:** Percentage and the number of data visualization techniques per newspaper

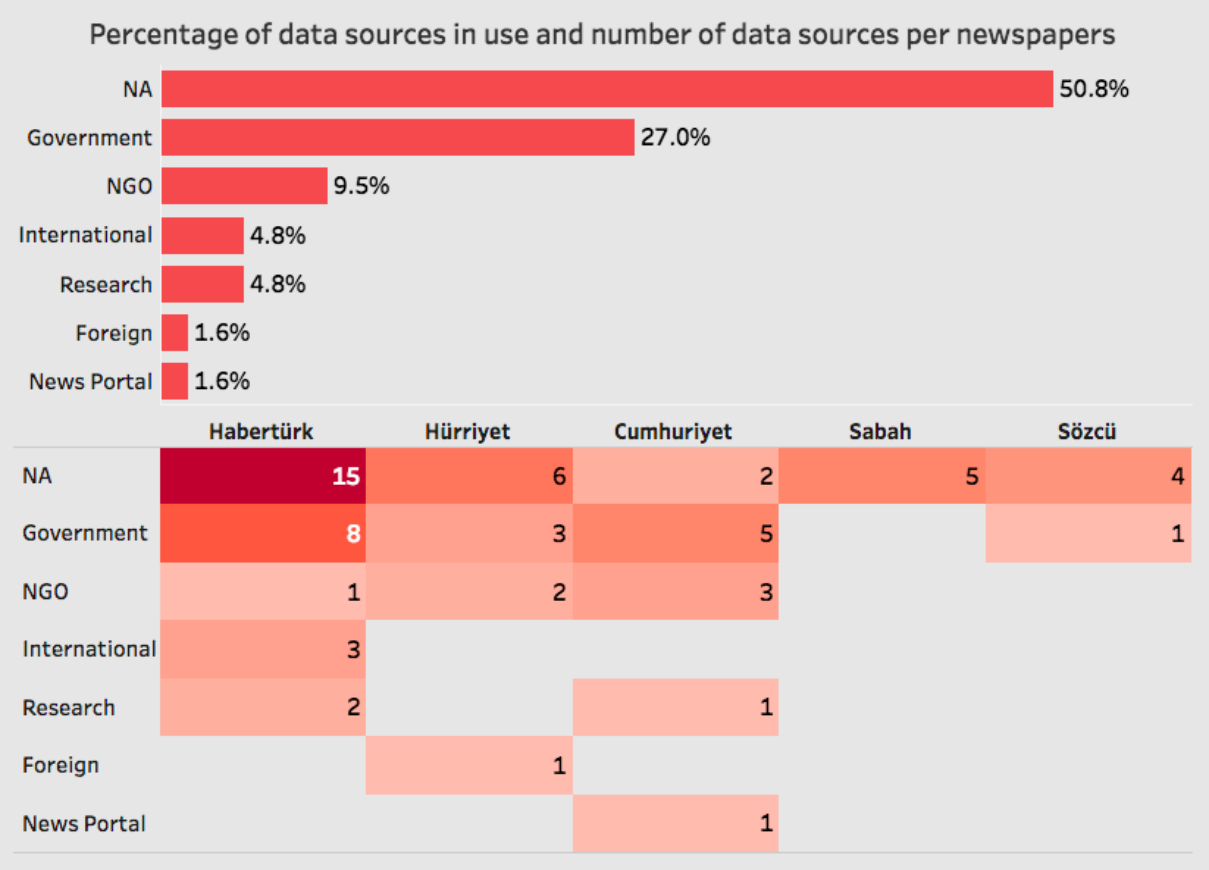



used in by 22.2 percentage of news reports, the mixed charts which contain more than one visualization techniques were used by 19 percent in newspapers. Also, when the proportions of data visualization techniques were distributed per newspapers, Habertürk published more stories with the line chart, bar chart, mixed charts and pie chart while the percentage of produced news stories with line charts is greater than the other data visualization techniques. While Hürriyet has almost balanced distribution on the number of data visualization, Sabah used more maps in its news stories and Cumhuriyet used more bar charts. As a result of these newspapers still used basic data visualization techniques but Habertürk, Hürriyet, and Cumhuriyet combined least two of these data visualization techniques, which is called as mixed charts in this study, to enrich and enhance their news reporting.

In addition, another aspect of this study is to uncover which data sources newspapers use when they cover issues with data. According to the study that was conducted in three weeks and as can be seen in chart 5.7, five selected newspapers used government data sources (27 %), non-governmental data sources (9.5 %), international data sources and research (4.8%) and foreign

data sources and news portal (1.6%). The most interesting insight from chart 5.7 is that more than half of the news stories (50.8 %) did not mention their data sources.

**Chart 5.7:** The percentage of data sources in use and number of data sources per newspapers



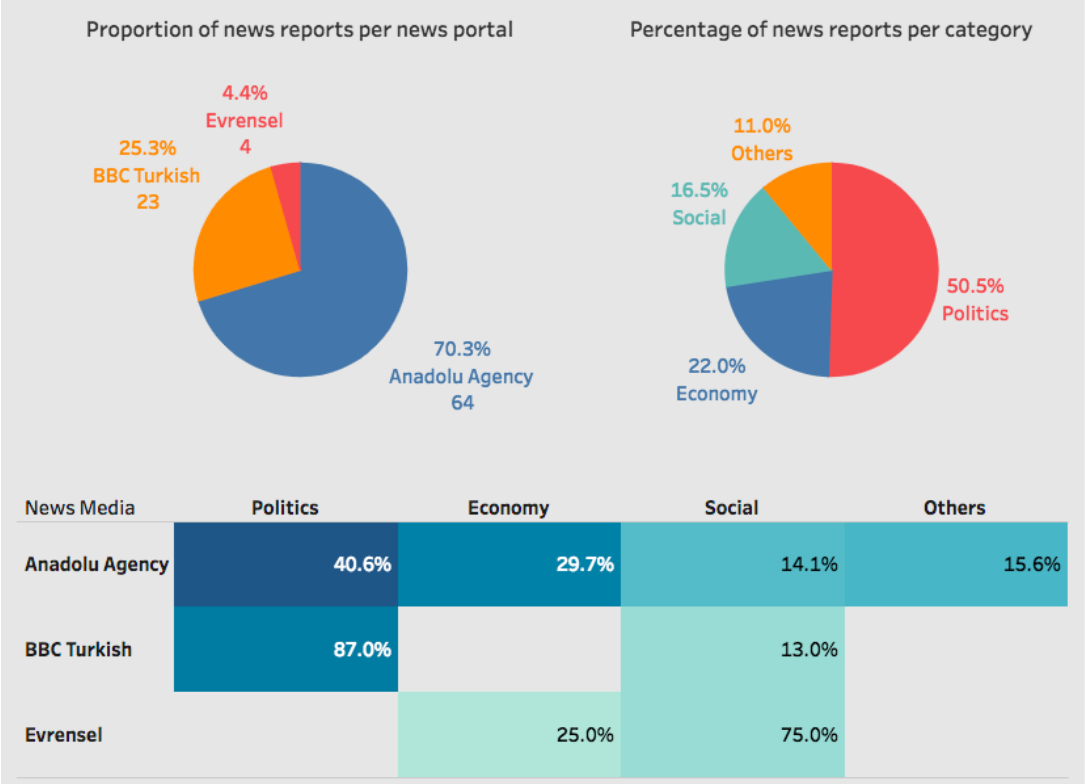

Also, if existing values deployed per newspapers as it is in chart 5.7, it can be said that 32 out of 63 news stories did not cite their data sources (NA = Not Applicable mean no citation for data sources in the news story) and Habertürk (fifteen of its news reports), Hürriyet (the six of its news reports), Cumhuriyet (two of its news reports), Sabah (all of its news reports), Sözcü (the four of its news reports) did not mention data sources they use in their news stories. While four out of five newspapers: Habertürk, Hürriyet, Cumhuriyet, and Sözcü cover news stories with mostly official data from government offices like Turkish Statistical Institute, unlike the other newspapers Habertürk also benefited from, international data sources such as OECD, WHO etc.

### 5.3.2 Use of data visualization in digital news media

Digital news media portals: Anadolu Agency, BBC Turkish, Evrensel.net, Birgün.net and 140 Journos were monitored to evaluate current use of data visualization in digital news media. The

five selected digital news media outlets were picked for this study, because, their content production features more data-driven news stories than the other digital newsrooms. For example, Anadolu Agency and Birgün has its own infographic webpage for data visualizations while BBC Turkish and Evrensel Online published data-savvy news stories. 140 Journos produces infographics for social media and its website to explain complex issues. These selected digital news outlets produced 91 news stories with data visualization. Although the number of news reports surpassed the number of news stories in newspapers, no data-driven story that was published by Birgün.net and 140 Journos were observed during the study was conducted. As the chart 5.8 demonstrates while by the 70.3 percent of news stories were produced

**Chart 5.8:** Proportions of news stories with data visualization per news portal and news category

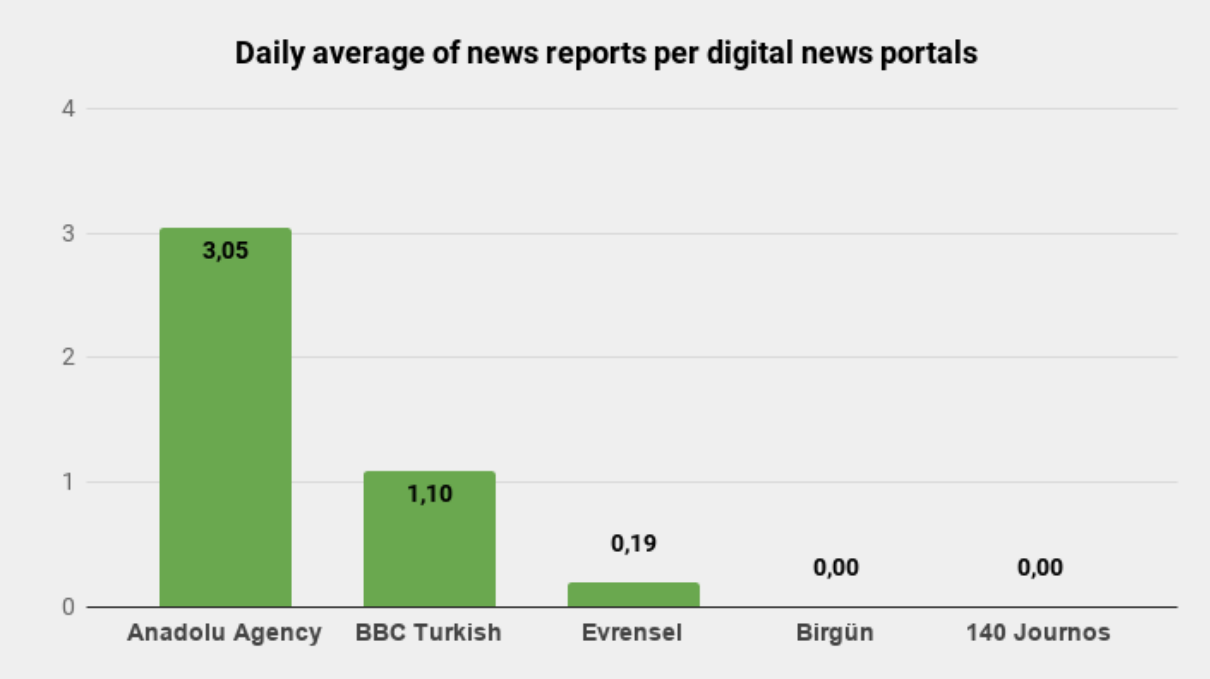



by Anadolu Agency, BBC Turkish and Evrensel.net published by 25.3 percent and by 4.4 percent of total number news stories respectively. Hence Anadolu Agency had the greatest number and proportions of news reports that were produced within the three weeks, whereas BBC Turkish tailed it but could not keep up with the pace of Anadolu Agency in publishing data-driven news stories.

Furthermore, another important insight in chart 5.8 is that the half of the news stories being published by digital news outlets is politics related. Despite the significant number of news reports were produced in the economy category by newspapers (chart 5.8), the proportions of news stories focused on the economy are only by 22 percent and it was followed by news stories in social issues by 18 percent and another topic by 11 percent. If these values were distributed per newspapers, chart 5.8 reveals that BBC Turkish produced news in only political and financial matters by 87 and by 13 percent respectively whereas Anadolu Agency published more news stories in political issues by 40.6 percent than its other categories. Also, Anadolu Agency and Evrensel.net were the only digital media outlets that report financial topics with data visualization by 29.7 percent and by 25 percent of the weighted average of their news reports respectively.

Another related insight about the number of news stories is that Anadolu Agency naturally dominated other digital news outlets in the daily average of news reports per news portal as it can be seen in chart 5.9

**Chart 5.9:** Daily average of news stories with data visualization per digital news portals

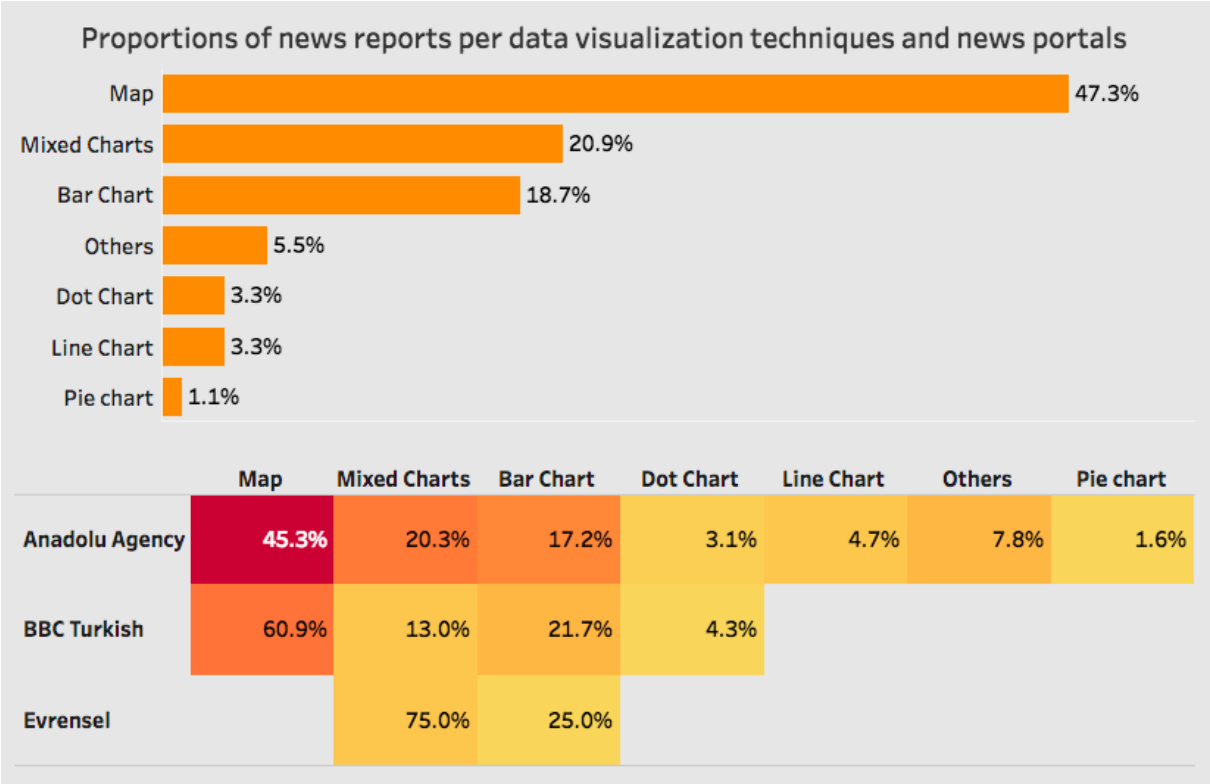



While Anadolu Agency published 3 news stories with data visualization, BBC Turkish and Evrensel.net followed by 1,10 and 0.19 news reports per day respectively in the three weeks the study was implemented. In this regard, the daily average of publishing news stories with data visualizations is still one news per day in both newspapers and digital media outlets except Anadolu Agency. As a matter of fact, as the findings from the study disclose that the situation

is worse than that in some newsrooms such as Birgün.net 140 Journos, Evrensel, Sabah, Sözcü, Cumhuriyet and Hürriyet dailies.

In addition, another parameter that was evaluated in the study is the data visualization techniques that were used by digital news media outlets. As can be shown in chart 5.10 nearly half of the news stories (47.3 %) used the map as a visualization technique while the proportion of mixed charts in news coverage followed by 20.9 percent. Then the third most used visualization technique is the bar chart by 18.7 percent of total news reports. Also, there are the variety of data visualization techniques such as dot charts that were utilized by digital news media unlike newspapers' preference of basic data visualization in news reporting (chart 5.6).

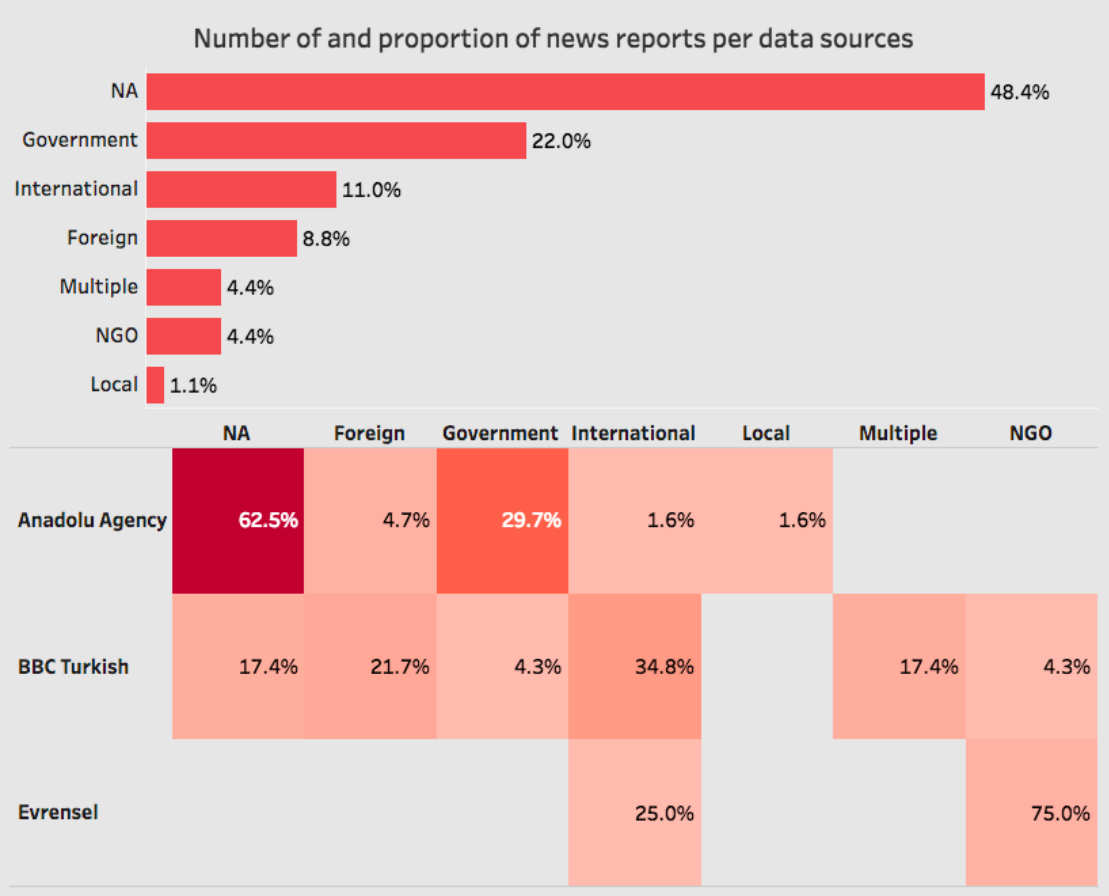
**Chart 5.10:** Proportion of news reports per data visualization techniques and news portals




Moreover, when the number of visualization methods that used was deployed per the digital media outlets, the chart 5.10 illustrates that Anadolu Agency and BBC Turkish featured mainly maps by 45.3 percent and by 60.9 percent respectively in their news coverage while they also utilized mixed charts, bar chart and dot chart in their news stories. Also, compared to the newspapers' use of visualization methods which are line chart and bar chart (chart 5.6), digital media outlets benefited from maps and mixed charts more frequently.

The last parameter in the study is the which data source news portal used during the three weeks. The chart 5.11 indicates that as it was similar to the newspapers, the almost half of the data stories in digital media had no mention its data sources whereas news portals that report with data used government sources by 22 percent, international sources by 11 percent, foreign sources by 8.8 percent. Also, some of the news stories (4.4 percent of it) used multiple data sources. If the percentage of data sources are distributed per digital media outlet in the study, Anadolu Agency and BBC Turkish did not cite data sources they use by 62.5 percent and by 17.4 percent respectively. There is a difference between BBC Turkish and Anadolu Agency, which is that first benefited from international and foreign data sources considerably, the latter cover stories with mostly government data sources. Unlike these two media outlets, Evrensel featured more stories with NGO data sources by 75 percent. Hence, compared to the use of data

**Chart 5.11:** The number and proportion of news stories with data visualization per data sources




sources in newspapers, digital news media portals also used government data as often as the newspapers and also did not mention their data sources in some stories by almost proportion which the figures are by 50.8 percent in newspapers and by 48.6 percent in digital media.

As a result of the use of data visualization in both newspapers and digital news media, it can be said that daily average of publishing news stories with data visualization is not enough, because, seven out of ten news media did not produce one news report per day (chart 5.3, chart 5.9). Also, even though digital news media outlets produced more news stories with data visualization in quantity than the newspapers, two of five news portals did not feature any data-driven story during the three weeks. Secondly as the previous study (Başgün, 2012) justified that the trend of employing data visualization practices on financial issues in newspapers continued in today's traditional newspapers (chart 5.4) while more political news stories more than financial news were covered by digital news portals frequently (chart 5.8). Thirdly, unlike the newspapers' basic implementation of data visualization, digital news portals featured more diverse data visualization methods (chart 5.6, chart 5.10). Fourthly, although news media in Turkey benefited from governmental and international data sources, unfortunately, both newspapers and digital media failed to cite half of their data sources when they cover issue with data visualization (chart 5.7, chart 5.11).

In the light of these insights, it can be said that production of news stories with data visualization in many newsrooms is not frequent and lasting. They cover financial, economic and political issues with data irregularly. Aside from the little sparks, traditional and digital newsrooms have deficiencies on use of data visualization in news reporting in terms of both quantitative and qualitative ways. Therefore, digital and traditional newsrooms in Turkey have yet to be adapted its news reporting into new trends like data visualization and data journalism. Therefore, why news media in Turkey could not integrate the craft of data visualization and data reporting into their news coverage and current challenges in front of the quantitative turn of journalism in Turkey are going to be addressed in the next section this study.

# 6. CHALLENGES OF THE USE OF DATA VISUALIZATON FOR NEWS REPORTING

## 6.1 SEMI STRUCTURED QUALITATIVE INTERVIEWS

The purpose of this study is to uncover current challenges that prevent newsrooms to integrate the craft of data visualization into news reporting. Although the quantitative content analysis, previous study, found out current use of data visualization is not sufficient and the numbers are not promising, these findings lay the groundwork for the qualitative component of the study to explore further regarding current challenges of utilizing data visualization that news media organizations have to deal with. Therefore, as it was mentioned methodology section of the thesis thoroughly, semi-structured interviews were conducted with 10 reporters & editors from digital and traditional media, who are experienced on data reporting, to find out their take on the challenges of using data visualization into news reporting in Turkey. Also, previous studies and relevant pieces of literature examine the subject were used to compare and contrast.

## 6.2 SIMILAR STUDIES IN THE LITERATURE

Despite fact that quantitative turn of the journalism and data visualization in news reporting has yet to be studied in Turkey, there are several studies and media reports in the US and Europe that focused on the challenges that constrained newsrooms regarding integration of data journalism and data visualization. Also, these studies delved into not only external challenges but also internal constraints in newsrooms. Newsrooms in Sweden points out mainly two constraints: the first is the lack of time to cover news with data, which contains the steps of collecting, analyzing and visualizing data, another is the absence of staff who has required skills to work with data efficiently (Appelgren and Nygren, 2014). Similarly, the study in United States reflects that newsrooms face four main challenges that may impact their way of works which are lack of time to make sense of raw data in 24 hours news cycle, lack of visualization and data mining tools, lack of competent reporters, and lack of legal supports when reporters work on official data (Fink and Anderson, 2015). Also, the study focused on Norwegian newsrooms notes similar challenges which are the accessibility of data regarding practical and legal aspects and visualizing analyzed data into understandable formats which readers can make sense of it easily (Karlsen and Stavelin, 2014). Moreover, Google News Lab Data Journalism in 2017 report shed lights to the akin challenges and barriers that deter newsrooms to do efficient data reporting (Rogers, Schwabish, and Bowers, 2017). According to the report

newsrooms in US and Europe suffers from time pressure when they cover stories with data, inconsistent data structures and formats which may cage the data into non-machine-readable formats like scanned pdf, deficiency of required skills, limitations of existing visualization tools and most importantly unclear return of investment (Rogers, Schwabish, and Bowers, 2017).
On the other hand, there are studies that highlight the current challenges of data journalism and data visualization by classifying them into the internal and external constraints and also relating to the organizational and managerial structure of the newsroom (Smit, Haan, and Buijs, 2014; De Maeyer et al., 2015). In the first study Smit, Haan and Buijs (2014, p. 351) indicate "challenges relating to skills at an individual level, mindset at a group level and management at an organizational level". While the first challenge relates to the diverse data visualization skills that reporters or designer must have to cover stories with data, the second challenges is about mentality of data team which may block collaboration among the departments and lastly the third constraint is based on evolving concept of news in newsroom rather than hiring people from different field by managerial decisions (Smit, Haan, and Buijs, 2014). Similarly, the second study mainly assesses the situation in Belgian newsrooms, also distinguishes constraints into three categories, which are "obstacles within the news organization, obstacles outside the news organization, and obstacles that emerge at a more individual level" (De Maeyer et al., 2015, p. 441). So that internal obstacles are lack of time, financial resources and traditional workflow of news reporting whereas external constraint is that even though Belgium has an open data policy, accessing and using public data are not an easy task (De Maeyer et al., 2015). Also, the third challenge in Belgian newsrooms is the journalists' avoidance of numeracy skills which is "a mental block at play rather than real technical impediments" (De Maeyer et al., 2015, p. 443).

### 6.3 CHALLENGES

Ten people from digital or traditional newsrooms point out following challenges of the use of data visualization in journalism: time, lack of technical skills, limitations of tools, availability of data, unsuitable data formats such as pdf, lack of demands from readers, insecure and unsustainable business model, political atmosphere.
In addition, even though monitoring newsrooms' use of data visualization provides quantitative insights regarding their frequency of data reporting and which news category they feature more news story with data visualization, hearing editors' and reporters' own words about how they practice data journalism & data visualization, whether they have dedicated personals for this

new trend and what are the reflections of top management may facilitate great deal of findings regarding the subject. Therefore ice-cracking questions came in handy to figure out how newsrooms cover stories with data, do they have dedicated data journalists or data visualization experts and what is the managerial mindset relating to the application of new trends into news reporting.

First of all, many editors and reporters state that they cover stories with data but it's not at the desirable pace they prefer. In this regard Özer (2018), an editor from Evrensel.net notes:

> Although it is not higher proportions, we use data to cover in the particular topics such as deceased workers and women's murders in a monthly basis. Also, we produce not only two-dimensional infographics but also video graphics to visualize data (Özer, M. Personal Communication, 10 February).

Similarly, two editors from Birgün.net stress "we use data in our news reporting but not at the pace we wanted and it is not a frequent practice we did" (Şahin, U.; Karaca, A. 2018, Personal Communication, 15 February). But it seems the new trends in journalism were taken over by digital news portals as Şahin claims that:

> We started to cover stories with data visualization for about one year ago and we transformed our news reporting a lot since then and Birgün Graphic is one of the developments for this purpose (Şahin, U. 2018, Personal Communication, 15 February).

Moreover, reporters or editors from BBC Türkçe, Bianet.org, Sol.org, 140 Journos, Habertürk, Dağ Medya, Hürriyet Daily News told that they are using data in their news coverage. While Ulukaya from Bianet said "it is rare in Bianet but we cover stories with data more than mainstream media does" (Ulukaya, C. 2018, Personal Communication, 25 February), Pürüzsüz from 140 Journos claimed that "we support our news reporting with research, statistics and chronological information" (Pürüzsüz, C. 2018, Personal Communication, 15 February). Also, Köker from BBC Türkçe noted that they benefit from quantitative data in two ways:

> We feature data in our news reporting as much as possible and use two types of datasets: firstly, we visualize the publicly available datasets and secondly, we prepare our datasets from different sources to cover particular topics. As a result, the importance of data in our news coverage grows steadily (Köker, I. 2018, Personal Communication, 20 February).

Furthermore, some of the interviewees define what they do in details by saying:

> In fact, our job is to convert data into news and explain the numbers so that reader can easily comprehend. Data visualization can be counted as the summary of the news. Instead of using all the data in news reporting, we narrowed data to tell the best story possible in order to be understood easily (Sert, N. 2018, Personal Communication, 20 February).

Similarly, Pınar Dağ, a journalist from Dağ Medya and data journalism lecturer in Turkey points out the growing importance and inevitability of data in news reporting:

> I feature quantitative data in news coverage frequently. Although using data in journalism as a source is not novel, new tools provide better possibilities to cover news with data. In Turkey reporters benefited from tables, maps, graphics, information visualization in journalism but today interactivity, engagements, availability of data and new tools etc. pave the ways for the inevitability of data reporting and data visualization in journalism (Dağ, P. 2018, Personal Communications, 21 February).

Second of all, there is a division of labor in newsrooms in Turkey rather than hybrid reporters that can contribute both reporting and visualization aspects of the news. Also, data visualization is seen as an area of expertise of digital news portals of traditional newspapers. Some of the newsrooms have no dedicated employee to cover news topics with data. Here what they say about this matter:

> We have no employees that identify themselves as data reporter or data visualization expert and we are two groups: digital and newspaper teams. Data visualization practices are mostly done by the digital team. In this case, our editors work with a software developer to visualize their data (Özer, M. 2018, Personal Communication, 10 February).

> We have two employees work on data reporting: one produces data visualization for both digital portals and newspapers, another works as a graphic designer, but they do not define themselves as data journalism and data visualization experts. It is because covering news with data is not their only task. (Şahin, U. 2018, Personal Communication, 15 February).

> I'm not defining myself as data journalist but I'm the one who has skills to visualize data in BBC Turkish. Aside from this, BBC World Service has its own Visual Team which we consult, get help and collaborate with. Especially we collaborate with BBC Visual Team in very advanced and interactive multimedia news (Köker, I, 2018, Personal Communication, 20 February).

> We have interactive team contain graphic designers and reporters works on interactive journalism projects. But in the workflow reporters demands and graphic designers produce data visualizations (Yıldız, T. 2018, Personal Communication, 17 February).

> We have no staff that meets the data visualization and data reporting needs in Bianet. I try to meet the need of the newsroom as multimedia and social media editor (Ulukaya, C. 2018, Personal Communication, 25 February)

> There is no dedicated data journalist in the newsroom. I have a basic skill to analyze and visualize data but mainly graphic designers take responsibility for visualizing data and preparing it for the print (Esen, E. 2018, Personal Communication, 21 February).

Third of all, one of the most important aspects of adapting news media to new technologies and trends is the managerial mindset as Smit, Haan and Buijs (2014) argued. In this regard, many of the editors & reporters stated their top management encourages them to learn new skills. While this encouragement may not be financial in some cases, it may also be ignored by management. For instance, Özer states that "there is no problem about top management's helping out when the reporters or editors tend to train themselves" (Özer, M. 2018, Personal Communication, 10 February). Similarly, Şahin claims that "we started this with the support and encouragement of the top management" (Şahin, U. 2018, Personal Communication, 15 February). Another editor from Birgün.net claims that:

> Alternative news media in Turkey is interested in data journalism and new media practices. We are encouraged and supported by management in Birgün.net, even though this cannot be the financial encouragement. Also, the effect of the data reporting and data visualization work show itself in engagement metrics. When management notice this interest and engagement, they become prone to maintain this kind of reporting in the newsroom (Karaca, A. 2018, Personal Communication, 15 February).

On the other hand, some newsroom may not have interested in training their employees or do not create the opportunity for as it is stressed that "there is no incentive regarding data visualization and data reporting in our newsroom" (Ulukaya, C. 2018, Personal Communication 25 February). Similarly, the same support and encouragement may be reflected differently in Hürriyet Daily News. Esen argues that:

> Of course, management wants their employees well-trained but management only expects this, there are no training activities related to data journalism and data visualization in Hürriyet or outside of it. Also, there are in-house training activities, but joining them is a matter of time and it may not be granted. Besides as I know the current curriculum of the in-house training is not related to data reporting and data visualization (Esen, E. 2018, Personal Communication, 21 February).

As a consequence, firstly, there are data journalism and data visualization practices in news media even though it is not at desirable level. Secondly, workflow in newsrooms done by separate departments and staff rather than hybrid reporters that can contribute both reporting and visualization aspects of the news. Also, according to the editors, data visualization is perceived as the job of the digital news media. Thirdly, the majority of respondents claims that they are facilitated and encouraged by their management while there are some cases that newsroom ignores staff's demands or even does nothing to train their employees.

### 6.3.1 Challenge 1: Lack of time

As it is stated as one of the obstacle reporters face in American, Swedish and European newsrooms (Fink and Anderson, 2015; Appelgren and Nygren, 2014; Rogers, Schwabish, and Bowers, 2017), time seems as a challenge for news reporter in Turkey too.

> Time is a challenging factor for us. It is because we have limited resources and staff and also, we can publish two news stories for the time we spend to produce data visualization and infographics (Şahin, U. 2018, personal communication, 15 February).

As can be seen in the statement of Şahin, editor in Birgün.net, producing data reporting and data visualizing take more time than traditional news reporting. Similarly, another reporter from Birgün.net points out that "the biggest constraint is time because covering news agenda in Turkey is labor-intensive. Hence it limits our ability to work on data" (Karaca, A. 2018, personal communication, 15 February). Moreover, editors from mainstream newspapers assert

that “time is a significant element when working with data and producing data visualization” (Esen, E. 2018, Personal Communication, 21 February; Sert, N. 2018, Personal Communication, 20 February).

### 6.3.2 Challenge 2: Technical skills

> Reporters do not have the required technical skills on data reporting. In order to accomplish the task, one needs to imagine, but reporters do not even have such an imagination (Özer, M. 2018, Personal Communication, 10 February).

As it is indicated by Özer, the state of technical skills regarding data visualization and data journalism being poor also acknowledged unanimously by other interviewees too. While Şahin claims that “

> I see significant deficiency of technical skills in journalists. I am a graduate of journalism school but current education also can’t meet these needs. I believe there is a serious negligence on the technical competency and these skills can only be learned by personal efforts (Şahin, U. 2018, personal communication, 15 February),

Another reporter from same newsrooms share the similar insights regarding the challenge of technical skills by saying “reporters and editors focus on the news more and new media practices are not widespread enough yet” (Karaca, A. 2018, Personal Communication, 15 February). Similarly, Ulukaya, editor from Bianet stresses that “an average editor in Turkey’s news media does not have data literacy capability to produce data stories” (Ulukaya, C. 2018, Personal Communication 25 February), whereas Dağ argues that “it is not right to say that newsrooms in Turkey keep up with the level of US and European newsrooms that cover stories with data efficiently” (Dağ, P. 2018, Personal Communications, 21 February).

### 6.3.3 Challenge 3: Limitations of tools

Some of the respondents assert that they suffer from limitations of tools that they use to analyze and visualize datasets. In this regard, Özer points out that:

> One of the most prominent constraints is that data reporting requires a variety of tools to produce works. Therefore, journalists rely on more than two or more tools to get the job done and this makes things difficult in news reporting. (Özer, M. 2018, Personal Communication, 10 February).

The statement of Özer can be read as depending on more tools impacts the productivity of the work. Therefore, he suggests that “we have to develop our tools and by the way, we have our in-house template which we use in our video graphics” (Özer, M. 2018, Personal Communication, 10 February). The same challenge was also mentioned in case studies of Sweden, US and Google News Lab’s Data Journalism in 2017 report (Fink and Anderson, 2015;

Appelgren and Nygren, 2014; Rogers, Schwabish and Bowers, 2017). Similarly, Yıldız, graphic designer and editor from Sol.org states that "tools like Piktochart and Carto may constraints us" (Yıldız, T. 2018, Personal Communication, 17 February), whereas Ulukaya, an editor from Bianet, approaches the challenge from different perspectives which she argues that "the website of the news media I work at does not have the compatibility with new technologies in data visualization" (Ulukaya, C. 2018, Personal Communication 25 February). It seems what she tries to emphasize is the content management system is outdated, which is also a technical challenge regarding the matter.

### 6.3.4 Challenge 4: Availability of data and data formats

Another challenge that is frequently pointed out is the availability of data and unsuitable data formats to work with. Most of the respondents approach the amount of data available skeptical and mainly complain about the reliability of the official data sources. Also, public institutions' data formats such as pdf were seen as a challenge for journalists. In this regard Özer, editor from Evrensel.net and Esen, editor from Hürriyet Daily News saw not only insufficient amount of data in Turkey but also the improper data formats like pdf as challenges for covering news with data (Özer, M. 2018, Personal Communication, 10 February; Esen, E. 2018, Personal Communication, 21 February).

Moreover, Köker stresses that finding clean and tidy datasets to analyze is a challenge (Köker, I, 2018, Personal Communication, 20 February), while Yıldız assert that amount of data and the qualities of datasets such as up to datedness, are unsatisfactory and limit their ability to analyze and visualize datasets (Yıldız, T. 2018, Personal Communication, 17 February).

In addition, Özer and Şahin claim that reliability of official data sources is arguable (Özer, M. 2018, Personal Communication, 10 February; Şahin, U. 2018, personal communication, 15 February), whereas Dağ and Karaca note mainly the accessibility to open data as a challenge (Dağ, P. 2018, Personal Communications, 21 February; Karaca, A. 2018, Personal Communication, 15 February).

### 6.3.5 Challenge 5: Lack of interest of readers

The fifth challenge that was stated by two respondents is the reader's lack of interest in data journalism and data visualization. Özer asserts that:

> There is lack of interests at reader's side in Turkey. There should be demands from audiences in order to be produced the supplies. For that reason, newsroom does not demand data visualization works from

> reporters and editors and that's why visualization and data reporting do not become main agenda of the editor desk in our newsroom (Özer, M. 2018, Personal Communication, 10 February).

As it is clearly asserted that reader's interests and expectations for new approaches to journalism are pointed out as another challenge. Also, Ulukaya relates this assumption to reader's level of data literacy in Turkey which leads to the insufficient interest for the quantitative turn of journalism (Ulukaya, C. 2018, Personal Communication 25 February).

### 6.3.6 Challenge 6: Unsustainable business model

The sixth challenge that is stated by interviewees is the insecurity and unsustainability of news media's business model. While many of the respondents have pessimistic viewpoints regarding the current business models of news media which is the advertising, there are also suggestions require reader's contribution that may save the news media and support it to invest on data visualization. In this case while Özer and Esen emphasizes that existing conditions of news media cannot provide investments for data visualization and even if it does, that do not generate profitable returns for investment, in the same way according to Esen, hiring data journalists is a luxury for the 90 % of the news media while some news outlets fire their staffs nowadays (Özer, M. 2018, Personal Communication, 10 February; Esen, E. 2018, Personal Communication, 21 February).

Furthermore, Karaca and Şahin, editors from Birgün.net relate unsustainable business model of news media with the political oppression toward their news making because of their editorial policy, independence and critical stance against the government (Karaca, A. 2018, Personal Communication, 15 February; Şahin, U. 2018, personal communication, 15 February). For that reason, they emphasize that it is impossible to invest data journalism and visualization with limited resources that are related with not only insecure business models but also political reasons (Karaca, A. 2018, Personal Communication, 15 February; Şahin, U. 2018, personal communication, 15 February). These insights support that advertising market is utilized by ruling party as stick and carrot as Yanatma (2016) argued.

In addition, while Karaca assumes that establishing dedicated data team to cover stories with data-driven hard facts may provide reader's trust to pay for the news (Karaca, A. 2018, Personal Communication, 15 February), Dağ also share the similar consideration relating to business model of the news media by saying original news contents are always the means that readers might pay for if news media outlets are prone to be open new trends and approaches for journalism (Dağ, P. 2018, Personal Communications, 21 February). Also, there are newsrooms

that do not depend current advertising market as Ulukaya argues that business model is not a challenge for Bianet because of it funded by an NGO and if editorial team tend to focus on data visualization, the resources can be directed for this purpose (Ulukaya, C. 2018, Personal Communication 25 February).

### 6.3.7 Challenge 7: Political atmosphere

The last challenge that is mentioned by the respondents is the current political state of the country which is still governed by the state of emergency during this dissertation being written. In this case, Özer argues that news media sector cannot predict the one year later during the current political atmosphere, thus investing in data visualization and data reporting which may not generate the return of investment in the near future is a risky decision (Özer, M. 2018, Personal Communication, 10 February). Similarly, Esen points out that current political climate is not very beneficial for 90 percent of the news media organizations and also, today's thriving news media outlets do not sure about what the future brings, as a result investing new trends in news reporting under the current political atmosphere is difficult (Esen, E. 2018, Personal Communication, 21 February). The same assumption is also considered by Sert, a news editor from Habertürk Daily, which she asserts that even though the current political state does not impact investments directly, it influences the whole ecosystem in an indirect way (Sert, N. 2018, Personal Communication, 20 February). Lastly, Dağ stresses that censorships, political strains, unresolved chaos atmosphere, arrests of journalists may slow down the adaptions and investments of newsrooms into new trends and approaches of journalism (Dağ, P. 2018, Personal Communications, 21 February).

# SUMMARY & CONCLUSION

Data visualization is a popular term in today's news media ecosystem, but it has a long historical background related to cartography, statistics, and news-making (Friendly, 2006; 2009). Similarly using data for journalistic purposes is not a novel trend, it has been used in news reporting since the 17th century. Today data visualization is one of the fundamental processes of data journalism. This process includes not only presentation of data within the news stories but also using data visualization as an exploratory tool to make sense of complex issues (Few, no date; Kirk, 2012; Cairo, 2017).

Moreover, in the backdrop of quantitative turn of journalism, there are theoretical progress and the advent of computing technologies along with ubiquity of data that paved the way for the rise of the data-driven approaches in journalism (Friendly, 2006; Howard, 2014; Cairo, 2017). These developments stimulated concrete innovations in the second half of the 20th century with computer-assisted reporting that empowered investigative journalism in the US (Cox, 2000; Howard, 2014). The fundamental change has accelerated with the ubiquity of data and data leaks such as WikiLeaks, Paradise Papers etc. which encourage news media to cover stories with data and establish data teams and desks within the newsroom. In this regard, many newsrooms have started to employ data journalism tools and methods such as Guardian's Data Blog, New York Times, Five-Thirty-Eight etc. Also, the sparks began with Guardian's launch of Data Blog, today have transformed into a flame and it has kept going with data journalism practices in newsrooms such as La Nacion, Der Spiegel, Washington Post, news media reports and academic papers that further explore theoretical, historical backgrounds and external and internal factors that play important roles on integration of data journalism into traditional news reporting. Unsurprisingly, data journalism wave that urges newsrooms to support their news reporting with the power of data has also impacted newsrooms in Turkey too. While it does not at the same level and quantity as it does in the US and European newsroom, there are variety of news reporting examples that benefited data journalism methods and tools such as, Dağ Medya's Deceased Workers Database[36], Bianet's compile of human rights violations[37], Femicide Map in Turkey[38], Networks of Dispossessions[39] and Last Ten Years of Imam Hatip

[36] https://dagmedya.net/2014/09/02/turkiyede-madenciligin-acik-veritabani-projesi-tamamlandi/
[37] http://bianet.org/bianet/ifade-ozgurlugu/119085-bia-medya-gozlem-raporlari
[38] http://kadincinayetleri.org/
[39] http://mulksuzlestirme.org/index.en/

Schools[40]. Also, a couple of newsrooms: Dag Media, Birgün.net, BBC Türkçe, Evrensel.net, Anadolu Agency, Bianet.org, Sol.org and 140 Journos produce similar works that match with the trends of data journalism and data visualization in news media.

However, current news media landscape in Turkey is not very promising for new practices of news making. Most visited digital media portals are owned by traditional news media even though digital-first news media outlets started to grow steadily in the recent years (Yanatma, 2017a; 2017b). News media depends on advertising to generate revenue but its downside is that public advertisements and one-fifth of private advertising are open for political manipulation (Yanatma, 2016). Even though there are reader-based funding trials, none has yet to be succeeded (Yanatma, 2017b) Also, news media outlets deal with not only financial obstacles but also weaken press freedom regarding political oppression and arrests under the ongoing state of emergency (Yanatma, 2017b; Beiser, 2017). The same conditions are also valid for small-scale digital news sites which have no owner since they rely on advertising revenue to survive. Although these digital-first news sites seem as a proper way to practice free and independent reporting, they have to keep up with the vigorous competitions which are the online news sites of mainstream media outlets (Çevikel, 2004; Şenyüz, 2018). This competition is not a fair one, because digital news media can't get enough share from current advertising market and advertising sector do not consider the internet publications as a priority (Şenyüz, 2018). Hence, it seems news media outlets face constraints of dominant media ownership, insecure business model and fading press freedom.

Furthermore, according to the research's findings, use of data visualization in news reporting in both newspapers and digital news portals is not satisfying under the current news media landscape in Turkey. The quantitative content analysis found out that that seven out of ten news media outlets did not produce one data-driven news story per day. Therefore, it can be said that news media coverage with data is not regular and systematical. The same insights regarding the use of data visualization in news coverage were also stated by the interviewees, which is that covering stories with data and visualization is not at desirable level. Another insight from content analysis is that newspapers cover more economy-related stories with data visualization as it is similar to in the past study (Başgün, 2012), whereas digital news portals preferred political issues to use data visualization. As it mentioned in content analysis section that there are other parameters out of daily frequency of stories and categorical distributions of stories regarding covering stories with data between newspapers and digital news media. These

[40] https://dagmedya.net/imamhatipliseleri/

parameters were choice of data visualization techniques in news stories and use of data sources in data visualization. While the first parameter uncovered that digital news media portals used more diverse and advanced data visualization methods than newspapers, the latter revealed that both news media outlets depends on the datasets of the government's statistical office to cover news with data.

In addition, according to qualitative component of the study that scrutinizes the challenges of using data visualization in news making, majority of interviewees pointed out that despite they strive to publish more data-savvy reporting, their news coverage with data visualization is not enough and not at desired level, which can be supported by findings of content analysis. Also, many respondents indicated that the workflow of their newsrooms are carried out by two separate departments (editor desk and designers or developers) when the case is data visualization and data journalism because they have no hybrid reporters that can contribute both reporting and visualization side of the story. In this regard, the majority of the interviewees remarked that news managers and chiefs in newsrooms encourage their staffs to improve themselves regarding data visualization and data reporting when they saw the engagements and impacts of the data-driven story. In contrast, there are some cases that newsroom ignores staff's demands or even does nothing to train their employees. Also, these encouragements could be ostensible or newsroom management cannot make time for training of their employees. While the current situation was pointed out by interviewees from newspapers and digital news media, they also highlighted seven challenges they face when they work with data and produce data visualizations. These challenges are lack of time to complete data journalism steps which consist of gathering data, cleaning data, analyzing data and visualizing data, lack of competent staff that have required technical skills to work with data, limited features of data analyses and data visualization tools, lack of available and tidy data and unsuitable data formats, lack of reader's interest, insecure business model and current political atmosphere of Turkey. While these challenges are similar to the constraints newsroom in Sweden (Appelgren and Nygren, 2014), United States (Fink and Anderson, 2015), Norway (Karlsen and Stavelin, 2014) and Europe (Rogers, Schwabish, and Bowers, 2017), challenges of current political atmosphere and lack of readers' interests in Turkey distinguish from the challenges and pitfalls European and US news media have to deal with.

All in all, for the first time this study approached the use of data visualization in Turkey from the journalistic point of view. In the light of quantitative and qualitative insights from the content analysis and interviews that scrutinized current state of the use of data visualization in

journalism and the significant challenges of utilizing data visualization in news making, it can be said that Turkish news media outlets have deficiencies on use of data visualization in news reporting in terms of both quantity and quality. As a result, news media in Turkey has yet to integrate data visualization and data journalism into news making. In my opinion, the successful transition can be possible by overcoming at least internal challenges such as lack of technical skills and qualified staff in the long run.

## 7.1 FURTHER QUESTIONS & EXPLORATION

In order to explore further about the adaptation of data visualization and data journalism in news reporting, a comprehensive quantitative study that encompasses the wide range of news media organizations and their employees and top management may be needed in the near future. In this thesis, this angle of the subjects was ignored due to the fact that current newsrooms constitute only the small sample of whole news media industry and it may not be reliable to generalize findings from such small samples to whole news media ecosystem.

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# APPENDICES

## 9.1 APPENDIX A

Dataset[41]: compile of news stories from five selected newspapers between for 3 weeks from 19th February 2018 to 11th March 2018.

| News Media | Date | News Categorty | Dataviz Technique | Data Source Category |
|---|---|---|---|---|
| Habertürk | 2/19/2018 | Economy | Line chart | NA |
| Habertürk | 2/20/2018 | Economy | Line chart | Government |
| Habertürk | 2/20/2018 | Economy | Bar chart | Government |
| Habertürk | 2/20/2018 | Others | Pie chart | NA |
| Sözcü | 2/20/2018 | Politics | Map | NA |
| Hürriyet | 2/20/2018 | Politics | Map | NA |
| Sabah | 2/20/2018 | Politics | Map | NA |
| Hürriyet | 2/21/2018 | Economy | Pie Chart | NA |
| Sabah | 2/21/2018 | Politics | Map | NA |
| Habertürk | 2/22/2018 | Social | Mixed Charts | Government |
| Habertürk | 2/22/2018 | Economy | Mixed Charts | NGO |
| Cumhuriyet | 2/22/2018 | Economy | Bar chart | Government |
| Cumhuriyet | 2/22/2018 | Economy | Mixed Charts | NGO |
| Hürriyet | 2/22/2018 | Economy | Mixed Charts | NGO |
| Hürriyet | 2/22/2018 | Economy | Bar chart | NA |
| Habertürk | 2/23/2018 | Economy | Line chart | NA |
| Sabah | 2/23/2018 | Politics | Map | NA |
| Sözcü | 2/23/2018 | Politics | Map | NA |
| Cumhuriyet | 2/23/2018 | Social | Bar chart | Research |
| Cumhuriyet | 2/23/2018 | Economy | Bar chart | Government |
| Cumhuriyet | 2/24/2018 | Economy | Line chart | NGO |
| Habertürk | 2/24/2018 | Social | Bar chart | International |

[41] Please find the dataset as spreadsheet file: https://docs.google.com/spreadsheets/d/1FDwTN33RtH534B4IG9GMePs9mt_ZwUD9OgHVnyVwAMY/edit?usp=sharing

| | | | | |
|---|---|---|---|---|
| Habertürk | 2/24/2018 | Social | Line chart | International |
| Hürriyet | 2/25/2018 | Social | Bar chart | Government |
| Hürriyet | 2/25/2018 | Economy | Line chart | NA |
| Sözcü | 2/26/2018 | Politics | Map | NA |
| Sabah | 2/26/2018 | Politics | Map | NA |
| Habertürk | 2/26/2018 | Politics | Map | NA |
| Habertürk | 2/27/2018 | Others | Mixed Charts | NA |
| Hürriyet | 2/27/2018 | Economy | Bar chart | NA |
| Sözcü | 2/27/2018 | Economy | Map | NA |
| Habertürk | 2/28/2018 | Economy | Line chart | NA |
| Habertürk | 3/1/2018 | Others | Line chart | NA |
| Habertürk | 3/1/2018 | Politics | Map | NA |
| Hürriyet | 3/1/2018 | Economy | Mixed Charts | Government |
| Hürriyet | 3/2/2018 | Economy | Line chart | NGO |
| Cumhuriyet | 3/2/2018 | Economy | Pie chart | Government |
| Hürriyet | 3/3/2018 | Politics | Bar chart | Foreign |
| Cumhuriyet | 3/3/2018 | Social | Pie chart | News Portal |
| Cumhuriyet | 3/3/2018 | Politics | Bar chart | NA |
| Habertürk | 3/3/2018 | Economy | Mixed Charts | NA |
| Habertürk | 3/3/2018 | Economy | Line chart | Government |
| Sabah | 3/4/2018 | Politics | Map | NA |
| Habertürk | 3/4/2018 | Others | Bar chart | NA |
| Cumhuriyet | 3/5/2018 | Economy | Bar chart | Government |
| Habertürk | 3/5/2018 | Economy | Line chart | NA |
| Sözcü | 3/6/2018 | Economy | Line chart | Government |
| Habertürk | 3/6/2018 | Economy | Line chart | NA |
| Habertürk | 3/6/2018 | Economy | Line chart | Government |
| Habertürk | 3/6/2018 | Others | Mixed Charts | NA |
| Cumhuriyet | 3/6/2018 | Economy | Mixed Charts | Government |
| Hürriyet | 3/6/2018 | Economy | Mixed Charts | Government |
| Habertürk | 3/7/2018 | Social | Bar chart | Government |
| Habertürk | 3/7/2018 | Economy | Line chart | Government |

| | | | | |
|---|---|---|---|---|
| Habertürk | 3/8/2018 | Economy | Bar chart | International |
| Cumhuriyet | 3/8/2018 | Economy | Mixed Charts | NGO |
| Cumhuriyet | 3/9/2018 | Economy | Line chart | NA |
| Habertürk | 3/9/2018 | Economy | Line chart | NA |
| Habertürk | 3/10/2018 | Social | Mixed Charts | Research |
| Habertürk | 3/10/2018 | Social | Map | Government |
| Hürriyet | 3/11/2018 | Economy | Line Chart | NA |
| Habertürk | 3/11/2018 | Economy | Map | Research |
| Habertürk | 3/11/2018 | Politics | Pie chart | NA |

## 9.2 APPENDIX B

Dataset[42]: compile of news stories from five selected digital news portals between for 3 weeks from 19th February 2018 to 11th March 2018

| **News Media** | **Date** | **News Category** | **Display** | **Dataviz Technique** | **Data Source Category** |
|---|---|---|---|---|---|
| Anadolu Agency | 2/19/2018 | Economy | Static | Mixed Charts | NA |
| Anadolu Agency | 2/19/2018 | Politics | Static | Map | NA |
| Anadolu Agency | 2/19/2018 | Social | Static | Dot Chart | Government |
| Anadolu Agency | 2/20/2018 | Economy | Static | Line Chart | Government |
| BBC Turkish | 2/20/2018 | Politics | Interactive | Mixed Charts | Multiple |
| BBC Turkish | 2/20/2018 | Politics | Interactive | Map | NA |
| BBC Turkish | 2/20/2018 | Politics | Static | Map | Multiple |
| Anadolu Agency | 2/20/2018 | Social | Static | Map | International |
| Anadolu Agency | 2/20/2018 | Politics | Static | Map | NA |
| Anadolu Agency | 2/20/2018 | Politics | Static | Map | NA |
| Anadolu Agency | 2/21/2018 | Economy | Static | Mixed Charts | Government |
| Anadolu Agency | 2/21/2018 | Politics | Static | Map | NA |
| Anadolu Agency | 2/21/2018 | Politics | Static | Mixed Charts | NA |
| Anadolu Agency | 2/21/2018 | Social | Static | Mixed Charts | Government |

[42] Please find the dataset as a spreadsheet file: https://docs.google.com/spreadsheets/d/1oyXA3y7DzCnVkI7i0pqbeJvA07gBDqEbJg9cWMT_spg/edit?usp=sharing

| | | | | | |
|---|---|---|---|---|---|
| Anadolu Agency | 2/21/2018 | Politics | Static | Bar Chart | NA |
| Anadolu Agency | 2/21/2018 | Politics | Static | Map | NA |
| BBC Turkish | 2/21/2018 | Politics | Static | Map | International |
| BBC Turkish | 2/21/2018 | Politics | Static | Map | International |
| Anadolu Agency | 2/22/2018 | Social | Static | Bar Chart | Government |
| Anadolu Agency | 2/22/2018 | Social | Static | Bar Chart | Government |
| Anadolu Agency | 2/22/2018 | Others | Static | Others | NA |
| Anadolu Agency | 2/22/2018 | Economy | Static | Bar Chart | Local |
| Evrensel | 2/23/2018 | Economy | Static | Bar Chart | International |
| Anadolu Agency | 2/23/2018 | Economy | Static | Map | NA |
| Anadolu Agency | 2/23/2018 | Politics | Static | Map | NA |
| Anadolu Agency | 2/23/2018 | Others | Static | Others | NA |
| Anadolu Agency | 2/23/2018 | Economy | Static | Pie chart | NA |
| Anadolu Agency | 2/23/2018 | Economy | Static | Map | NA |
| Anadolu Agency | 2/23/2018 | Politics | Static | Map | NA |
| Anadolu Agency | 2/24/2018 | Others | Static | Others | NA |
| Anadolu Agency | 2/25/2018 | Economy | Static | Map | Government |
| Anadolu Agency | 2/25/2018 | Politics | Static | Mixed Charts | NA |
| Anadolu Agency | 2/25/2018 | Politics | Static | Map | NA |
| Anadolu Agency | 2/26/2018 | Politics | Static | Map | NA |
| Anadolu Agency | 2/26/2018 | Politics | Static | Map | NA |
| Anadolu Agency | 2/26/2018 | Politics | Static | Map | NA |
| BBC Turkish | 2/26/2018 | Politics | Static | Map | International |
| BBC Turkish | 2/27/2018 | Politics | Static | Map | International |
| Anadolu Agency | 2/27/2018 | Economy | Static | Mixed Charts | Government |
| Anadolu Agency | 2/27/2018 | Politics | Static | Others | NA |
| Anadolu Agency | 2/28/2018 | Economy | Static | Bar Chart | Government |
| Anadolu Agency | 2/28/2018 | Others | Static | Map | NA |
| Anadolu Agency | 2/28/2018 | Economy | Static | Mixed Charts | NA |
| Anadolu Agency | 2/28/2018 | Politics | Static | Map | NA |
| Anadolu Agency | 3/1/2018 | Politics | Static | Map | NA |
| Anadolu Agency | 3/1/2018 | Economy | Static | Mixed Charts | Government |

| | | | | | |
|---|---|---|---|---|---|
| Anadolu Agency | 3/1/2018 | Politics | Static | Others | Foreign |
| Anadolu Agency | 3/1/2018 | Others | Static | Dot Chart | NA |
| BBC Turkish | 3/2/2018 | Politics | Static | Map | NGO |
| BBC Turkish | 3/2/2018 | Social | Static | Mixed Charts | Multiple |
| BBC Turkish | 3/2/2018 | Politics | Static | Map | International |
| Anadolu Agency | 3/2/2018 | Others | Static | Map | NA |
| Anadolu Agency | 3/2/2018 | Others | Static | Bar Chart | NA |
| Anadolu Agency | 3/2/2018 | Social | Static | Bar Chart | Government |
| Anadolu Agency | 3/2/2018 | Politics | Static | Map | NA |
| Anadolu Agency | 3/2/2018 | Social | Static | Bar Chart | NA |
| Anadolu Agency | 3/2/2018 | Others | Static | Map | Foreign |
| Anadolu Agency | 3/3/2018 | Others | Static | Map | Foreign |
| BBC Turkish | 3/3/2018 | Politics | Interactive | Map | Multiple |
| Evrensel | 3/3/2018 | Social | Video | Mixed Charts | NGO |
| BBC Turkish | 3/4/2018 | Politics | Static | Bar Chart | Foreign |
| BBC Turkish | 3/4/2018 | Politics | Static | Bar Chart | Foreign |
| Anadolu Agency | 3/4/2018 | Social | Static | Bar Chart | Government |
| Anadolu Agency | 3/4/2018 | Social | Static | Mixed Charts | Government |
| Anadolu Agency | 3/4/2018 | Politics | Static | Map | NA |
| Evrensel | 3/3/2018 | Social | Video | Mixed Charts | NGO |
| Evrensel | 3/5/2018 | Social | Video | Mixed Charts | NGO |
| Anadolu Agency | 3/5/2018 | Economy | Static | Line Chart | Government |
| Anadolu Agency | 3/5/2018 | Economy | Static | Line Chart | Government |
| Anadolu Agency | 3/5/2018 | Others | Static | Map | NA |
| Anadolu Agency | 3/5/2018 | Politics | Static | Bar Chart | NA |
| BBC Turkish | 3/6/2018 | Politics | Static | Map | International |
| BBC Turkish | 3/6/2018 | Social | Static | Map | International |
| BBC Turkish | 3/6/2018 | Politics | Static | Map | NA |
| Anadolu Agency | 3/6/2018 | Economy | Static | Mixed Charts | Government |
| Anadolu Agency | 3/6/2018 | Politics | Static | Mixed Charts | NA |
| BBC Turkish | 3/7/2018 | Politics | Static | Map | NA |
| BBC Turkish | 3/7/2018 | Politics | Static | Map | International |

| | | | | | |
|---|---|---|---|---|---|
| Anadolu Agency | 3/7/2018 | Politics | Static | Map | NA |
| Anadolu Agency | 3/7/2018 | Politics | Static | Map | NA |
| BBC Turkish | 3/8/2018 | Politics | Static | Bar Chart | Foreign |
| BBC Turkish | 3/8/2018 | Social | Interactive | Mixed Charts | Government |
| Anadolu Agency | 3/8/2018 | Economy | Static | Mixed Charts | NA |
| Anadolu Agency | 3/8/2018 | Politics | Static | Map | NA |
| Anadolu Agency | 3/9/2018 | Economy | Static | Map | Government |
| Anadolu Agency | 3/9/2018 | Economy | Static | Bar Chart | Government |
| Anadolu Agency | 3/9/2018 | Economy | Static | Mixed Charts | Government |
| BBC Turkish | 3/9/2018 | Politics | Static | Bar Chart | Foreign |
| Anadolu Agency | 3/11/2018 | Politics | Static | Map | NA |
| BBC Turkish | 3/11/2018 | Politics | Static | Dot Chart | NA |
| BBC Turkish | 3/11/2018 | Politics | Static | Bar Chart | Foreign |

### 9.3 APPENDIX C

Please click to below link to reach transcripts of 10 Interviews with news editors and reporters from news media in Turkey

Link: https://docs.google.com/document/d/18-vwu84FvbAp6FyAGpxgEG63hHWJpNBWjWo79pLzsMQ/edit?usp=sharing