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Evaluation of the Use of Visualizations in Data Journalism Articles on Mwananchi and the Chanzo Websites in Tanzania

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ABSTRACT

This study evaluated the use of visualizations in data journalism articles on Mwananchi and The Chanzo websites in Tanzania. The study had three specific objectives: to examine the frequency of journalists' data visualization usage; to identify the appearance of data visualizations in data-driven articles; and, to uncover the challenges journalists face in using visualizations. The study employed mixed-methods approach. Purposive sampling was used to select 59 respondents from Mwananchi and The Chanzo. The study used questionnaires and content analysis to collect data, which were analyzed using the Statistical Package for the Social Sciences (SPSS). The findings revealed that 34% of journalists rarely used data visualizations; while 25% used them occasionally; 17% used often; 16% never used; and 8% used very often. Among the 52 analyzed articles, 38% included visualizations, with Mwananchi having a slightly higher usage rate (42%) compared to The Chanzo (35%). The Findings means that still there is low usage of visualizations in most of the data articles. The study recommends comprehensive training programs to enhance journalists' data journalism skills, access to advanced visualization tools, and ongoing support to improve data-driven storytelling.

KEYWORDS: Data visualizations, Data Journalism, Infographics, Website

INTRODUCTION

Engelbrechtsen et al (2017) assert that data visualization plays an important role in journalism in Scandinavian newsrooms, also underscore that data visualization affects both journalistic content and interactional patterns of news discourse. The interaction of data journalism and visualization tools contribute in understanding the bigger picture of change in journalistic genres and its relationship to other, more general trends (Engelbrechtsen et al, 2017). The development of digital tools and practices, competition from social media, the open data movement and the general 'datafication' in society are factors external to the newsroom practices, which significantly shape and influence them (Rinsdorf & Boers, 2016).

In the United Kingdom debate about data visualization focuses on similar issues to debate about transparency in the news, especially in its relationship to objectivity (Tal & Wansink, 2016). Kennedy et al (2016) argue that data visualizations are filled with 'the quality of objectivity', which is in turn associated with characteristics such as trustworthiness. Data visualizations' appearance of objectivity has a number of origins: they report numbers, historically trusted because they appear universal, impersonal, and neutral (Porter, 1996); and they are associated with science, meaning they are sometimes seen to be objective and trustworthy (Tal & Wansink, 2016).

Ambrosio (2015) cited that despite data visualizations' appearance of objectivity, critics, data visualization experts argue that data visualization does not provide us with neutral windows onto data, they went on noted that rather, they are the result of numerous choices, it is claimed. He notes to engender trust, professional data visualizers may therefore need to be open about the choices they have made in the visualization production process. As news journalists increasingly include data visualizations in their professional toolkit, and because objectivity is an enduring and contested journalistic norm, it is important to examine how journalists perceive the data visualizations that they produce in relation to objectivity, and whether and how their perceptions inform transparency practices (Ambrosio, 2015).

Chiumbu and Munoriyarwa (2023) from Botswana argue that a ‘complete’ and professional data journalist requires programming, online data search, visualization, and verification skills. Tabary et al (2016) add that data journalism is no longer possible with the status quo in journalism schools because the new skills required by the data journalist include database management and statistical interpretation. Hannaford (2016) also argues that these skills have been domiciled in other disciplines like computer science and applied mathematics. Tabary et al (2016) imply that the existing journalistic skills normatively taught in journalism schools would be sufficient for data journalism practice.

According to Tabary et al (2016), data journalism is too limited to automated visualizations and utilization of already existing data sets, making no effort to change anything. Hence, existing journalism skills would adequately serve the new practice. Powell (2019) noted that obstacles to journalism in Tanzania generally take a variety of forms: a reliance on anecdotal evidence, or the reproduction of press releases, or meeting deadlines with weak stories in newsrooms under pressure, they went further and noted that these issues are symptomatic of a young media ecosystem. There are many reasons why data journalism and innovations are not continually practiced after traditional data training models such as hackathons and data boot camps, Lohner et al (2016) set out a list of attributes that shape journalism practice in a given country to better understand the overserved lack of uptake, Powell (2019) argued that these include historical developments, the political system, political culture, media freedom, level of state control and regulation of media by the state, media ownership and financing, structure of media markets, orientation of media, political/societal activity, journalism culture, and journalistic professionalism. Specific to Tanzania, conditions affecting journalists include low salaries, time constraints, editorial interference, poor education infrastructure, and limited access to information and security when reporting (Powell, 2019). For long, data produced by the government, NGO’s, UN agencies, research tanks and companies have not been well exploited by the media and the public in general (Nukta Africa, 2020).

In Tanzania few people understands that data can show them unexploited business opportunities or help them manage well their daily expenses, even those who knows the true value of data could not get enough data-driven news stories that would help them make rational decisions or understand broadly prevailing phenomena (Nukta Africa, 2020).

Nukta Africa (2020) cited that by then and until now, most of blogs and news apps in Tanzania are publishing stories about personalities rather than issues in politics, entertainment, fashion and sports, they went further and said undoubtedly, the stories are easy to produce and are in high demand among consumers especially the youth that’s why are highly preferred by publishers.

The rationale of this study is to Tanzanian newsrooms, whereby findings can directly inform newsroom practices in Tanzania and beyond, offering practical recommendations for improving the integration of data journalism and visualization, but also media institutes and training center may take the findings as the opportunity to understand the core problems of the visualizations shortage in the newsrooms and media schools may take findings as the starting point of reviewing their curriculum so as to include data journalism and visualizations.

The findings of this study is the aftermath of testing three specific objectives which are-- Examining the frequency of journalists’ usage of visualization on data journalism in *Mwananchi* and *The Chanzo* Websites in Tanzania, to identify the appearance of visualization on data-driven articles in *Mwananchi* and *The Chanzo* Websites in Tanzania and to find out journalists’ challenges in the usage of data visualization at *Mwananchi* and *The Chanzo* Websites in Tanzania.

METHODOLOGY

Study design

The study used case study design, involving *Mwananchi* and *The Chanzo* media houses located at Ubungo and Kinondoni Municipalities respectively both in Dar es Salaam city. Creswell (2003) define case study as researcher explores in depth a program, an event, an activity, a process, or one or more individuals. The researcher decided to use these two websites due to two main reasons; firstly, both are digital-oriented media that practice data journalism (owns ‘busy’ websites), and secondly the difference of their longevity in the industry - where *Mwananchi* has over 20 years in the media landscape, while *The Chanzo* has about four years since its establishment. Before selecting these two websites, the researcher did a simple group survey on other Tanzanians webistes including *Nipashe*, *The Guardian*, *Daily News*, and *Uhuru*. The researcher found that found most of them did not often practice data journalism, so they do not have visualizations in their articles, but also some websites are partially dormant, they just post few stories per day and some days they even don’t post.

Data collection

Questionnaire and content analysis were employed in gathering qualitative and quantitative data. The researcher distributed 59 questionnaires to journalists from *The Chanzo* and *Mwananchi*, so as to test their ability of using data visualizations tools. Not only journalists were involved, but also 52 articles were analysed (26 from *The Chanzo*, and 26 from *Mwananchi*). A coding scheme helped the researcher in the analysis of data visualizations in data-driven articles from *Mwananchi* and *The Chanzo* websites. The process involved coding process of assessing the visualizations’ presence, type, and effectiveness.

Data analysis

In the study, data was collected from a sample of 52 data journalism articles published on *Mwananchi* and *The Chanzo*, which were then coded to record the presence or absence of visualizations like charts and infographics. Using descriptive statistics, the frequency of visualization use across these articles was calculated, with SPSS helping determine the proportion of articles featuring visualizations and how usage varied between publications. A comparative analysis further highlighted differences between the two sites. To understand challenges journalists face in adopting visualizations, feedback from 59 journalists was qualitatively analysed to identify themes such as technical skills and tool access. Finally, the findings were interpreted through the Diffusion of Innovations Theory, underscoring visualizations as an emerging practice in Tanzanian journalism.

RESULTS

The frequency of journalists' usage of data visualization on data journalism on Mwananchi and The Chanzo Websites in Tanzania

The study found that the frequency of **data visualization** into their work as follow; 34% (20 respondents) rarely used them, 25% (15 respondents) occasionally, 17% (10 respondents) often used while 9 respondents (16%) had have never used and 5 respondents (8%) used data visualization very often. The findings suggest that while a portion of respondents frequently incorporate data visualizations, a significant number do so rarely or never. This indicates a potential area for development, as the majority of respondents do not regularly utilize data visualizations in their work.

While the frequency of incorporating visualization is not high also respondents' usage of digital tools for data visualization varied significantly. 17% (10 respondents) frequently utilized these tools, and 25% (15 respondents) used them occasionally. A majority, 58% (34 respondents), reported not using digital tools for data visualization at all.

Table 1: Table shows frequency of visualizations usage

Usage frequency	Respondents	Percentage
Never	9	16%
Rarely	20	34%
Occasionally	15	25%
Often	10	17%
Very often	5	8%

Source: Field Data

The appearance of data visualizations used in data journalism stories across articles from Mwananchi and The Chanzo Websites in Tanzania

The results showed that only 20 out of 52 articles (38%) included some form of data visualization. A significant majority, 32 articles (62%), relied solely on textual content without any visual aids. Also, *Mwananchi* had 11 out of 26 articles (42%) that contained visualizations; and, *The Chanzo* had 9 out of 26 articles (35%) that contained visualizations. This interval can also be shown in the findings which revealed varying levels of familiarity with data journalism among the respondents. Specifically, 20% (12 respondents) reported being very familiar with data journalism, while 25% (15 respondents) indicated they were somewhat familiar. A neutral stance was observed in 17% (10 respondents). Additionally, 20% (12 respondents) were somewhat unfamiliar, and another 17% (10 respondents) were very unfamiliar with data journalism.

But, another factor show the interval between one article incorporated with visualization is the comfort level of journalists while using digital tools for visualization. The study revealed comfort levels with creating data visualizations varied significantly: 14% of respondents (8 people) reported feeling very comfortable with creating data visualizations, 25% of respondents (15 people) indicated they were somewhat comfortable, 17% of respondents (10 people) were neutral regarding their comfort level, 25% of respondents (15 people) felt somewhat uncomfortable and 19% of respondents (11 people) felt very uncomfortable creating data visualizations.

Table 2: Table shows interval of visualizations

Data visualization	Website	Articles	Percentage
Include visualizations	Mwananchi	11	21%
	The Chanzo	9	17%
No visualizations	Mwananchi & The Chanzo	32	62%

Source: Field Data

Journalists' challenges in the usage of data visualization in data journalism stories on Mwananchi and The Chanzo Websites in Tanzania.

Respondents identified several challenges in integrating data journalism and digital tools into their work. A significant challenge reported by 51% of respondents (30 people) is the lack of training. This indicates a need for more comprehensive educational resources and training programs to enhance the skills required for effective data journalism. Additionally, 42% of respondents (25 people) cited technical limitations as a barrier. This suggests that current tools and technologies may not be adequately supporting the needs of journalists, necessitating improvements in the available digital tools. Without access to sophisticated tools, journalists and graphic designers may rely on basic software such as Microsoft Excel or manually create graphics, leading to lower-quality visualizations. This limits their ability to represent complex data in an engaging and clear manner, reducing the impact of data journalism articles. The visualizations may be too simplistic or not interactive, which diminishes the reader's ability to explore and understand the data.

Resource constraints were experienced by 34% of respondents (20 people), highlighting the need for better allocation and availability of resources to support data journalism initiatives.

Data access issues were faced by 31% of respondents (18 people), indicating that there are significant obstacles in obtaining the necessary data for journalism purposes. This points to a need for improved data access policies and systems. Without adequate data, journalists have a smaller pool of information to draw from, limiting the scope and depth of their data journalism stories. This forces them to use limited datasets or rely on secondary sources, which might not support more sophisticated or meaningful visualizations. As a result, the visual elements in articles are less informative, reducing the overall quality and impact of the data-driven stories.

Finally, 8% of respondents (5 respondents) mentioned other challenges, including time constraints and a lack of support from management. These additional challenges underscore the importance of organizational support and efficient time management in the successful integration of data journalism and digital tools. The pressure to publish quickly often leads to the use of basic or generic visualizations, rather than more customized, data-driven graphics. In some cases, visualizations may be omitted entirely from articles due to lack of time. Overall, these challenges highlight key areas where improvements and support are needed to facilitate the integration of data journalism and digital tools. Addressing these issues will require concerted efforts in training, technological enhancement, resource allocation, data access, and organizational support.

In addressing those challenges respondents identified several opportunities for expanding the use of data visualization tools. A significant majority, 59% (35 respondents), emphasized the importance of further training and skill development as a key opportunity. Additionally, 51% (30 respondents) suggested the necessity of access to more advanced tools. Collaboration with data experts was recommended by 42% (25 respondents) as a beneficial approach. Improved data access was highlighted by 34% (20 respondents) as an important factor. Moreover, 7% (4 respondents) mentioned other opportunities, including the need for an increased budget and the establishment of a dedicated data journalism team. These opportunities outline a clear path forward for enhancing the use of data visualization tools, focusing on training, access to advanced tools, expert collaboration, and better data access.

Table 3: Table shows challenges facing journalism

Challenges	Respondents	Percentage
Lack of training	30	51%
Technical limitations	25	42%
Resources constraints	20	34%
Difficult in accessing data	18	31%
Other challenges	5	8%

Source: Field Data

DISCUSSION

The frequency of journalists' usage of data visualization on data journalism on Mwananchi and The Chanzo Websites in Tanzania

In the context of the Diffusion of Innovations theory, which focuses on how new ideas and technologies are adopted within a social system, the findings from this study highlight the slow and uneven adoption of data visualizations in Tanzanian data journalism. Rogers' model explains that innovations spread gradually through stages: knowledge, persuasion, decision, implementation, and confirmation. The study's findings suggest that while some journalists have reached the "implementation" stage—incorporating visualizations into their articles—many are still in earlier stages, hesitant to adopt these tools or unaware of their full potential.

According to the findings suggest that while a portion of respondents frequently incorporate data visualizations, a significant number do so rarely or never. This indicates a potential area for development, as the majority of respondents do not regularly utilize data visualizations in their work. Lacking of visualizations in the data stories may lead to the diminishing of the quality as suggested by Powell (2019) Data journalism is not merely about tech and visualization; it involves all facets of quality journalism: critical thinking, quality writing, working off hypotheses, verification of facts from multiple sources and subject matter specialization, each informed by data-driven analysis.

The appearance of visualizations in data-driven articles in Mwananchi and The Chanzo Websites in Tanzania

The findings of this study indicate a significant gap in the use of data visualizations in data journalism stories on the *Mwananchi* and *The Chanzo* websites. More than half of the data stories published on these platforms do not include any form of visualization, and a majority of the respondents reported that they rarely use visualizations in their work. This lack of integration of visual aids in data stories is concerning, especially given the growing importance of data journalism in today's digital media landscape.

Several studies support these findings, highlighting the challenges and underutilization of data visualization in journalism. According to Bradshaw (2019), the inclusion of visual elements in data stories not only enhances audience engagement but also improves comprehension of complex information. Despite these benefits, many journalists still struggle to integrate visualizations effectively due to limited skills and resources.

Furthermore, Stalph (2020) argues that the infrequent use of visualizations in data journalism can diminish the impact of stories, as audiences are increasingly drawn to visually engaging content. The study's results echo this sentiment, suggesting that the absence of visualizations may affect the overall effectiveness of the articles published on *Mwananchi* and *The Chanzo*.

Journalists' challenges in the usage of data visualization in data journalism stories on Mwananchi and The Chanzo Websites in Tanzania

The findings of this study underscore the need for more comprehensive educational resources and training programs to enhance the skills required for effective data journalism.

Despite the growing importance of data journalism in modern newsrooms, the lack of adequate training remains a significant barrier to its effective implementation. This gap in skills has been reflected in the responses from journalists in this study, where many indicated infrequent use of data visualizations in their work.

The need for specialized training in data journalism has been widely recognized in academic literature. Bradshaw (2019) argues that the complexity of data journalism requires journalists to possess not only traditional reporting skills but also proficiency in data analysis and visualization. However, many journalists lack the necessary training to develop these skills, which can hinder their ability to produce impactful data-driven stories.

Knight and Cook (2018) emphasize that data journalism is a specialized field that requires continuous learning and adaptation. They highlight the importance of newsroom support in providing journalists with access to ongoing training and educational resources. Without this support, journalists may struggle to keep pace with technological advancements and emerging data journalism practices.

Moreover, Stoneman (2020) points out that many journalism schools have been slow to incorporate data journalism into their curricula, leaving graduates ill-prepared for the demands of the modern newsroom. This educational gap reinforces the need for targeted training programs that focus on data journalism skills, particularly in areas such as data analysis, visualization, and the use of digital tools.

Dowling and Vogan (2020) further argue that the lack of training in data journalism not only affects the quality of stories but also limits the ability of journalists to engage audiences. As audiences increasingly seek visually engaging content, journalists who are not equipped with the skills to produce such content may find it challenging to meet these demands.

To address these challenges, several scholars recommend the implementation of comprehensive training programs that go beyond basic data journalism skills. For instance, Rogers (2016) advocates for training that includes hands-on experience with data visualization tools and real-world applications. This approach would allow journalists to develop practical skills that can be directly applied in their work. Another way is to establish partnerships with organizations that specialize in data journalism and visualization, such as the International Journalists' Network (IJNet) or local universities offering media and communication courses. These organizations can provide workshops, online courses, and mentorship programs to equip journalists with the necessary skills to create effective data visualizations.

SUMMARY OF KEY FINDINGS

Basing on specific objectives the following are the key findings from the study according to the data collected;

About the frequency of visualizations embedded in data articles: Researcher found that frequency of incorporate data visualization into their work as follow; 34% (20 respondents) rarely used them, 25% (15 respondents) occasionally, 17% (10 respondents) often used while 9 respondents (16%) had have never used and 5 respondents (8%) used data visualization very often.

Appearance of the visualizations: Researcher revealed that only 20 out of 52 articles (38%) included some form of data visualization. A significant majority, 32 articles (62%), relied solely on textual content without any visual aids. Where also between those websites Mwananchi had 11 out of 26 articles (42%) that contained visualizations. The Chanzo had 9 out of 26 articles (35%) that contained visualizations. And this interval can also be shown in the findings which revealed varying levels of familiarity with data journalism among the respondents.

Challenges facing journalists to use visualizations: Respondents identified several challenges in integrating data journalism and digital tools into their work, with 51% (30 people) reporting a lack of training, underscoring the need for more comprehensive educational resources. Additionally, 42% (25 people) cited technical limitations, indicating that current tools may not sufficiently meet journalists' needs, while 34% (20 people) pointed to resource constraints, highlighting the need for better resource allocation. Data access issues were faced by 31% (18 people), emphasizing the need for improved data access policies, and 8% (5 people) mentioned other challenges, such as time constraints and lack of managerial support, underscoring the importance of organizational backing and effective time management.

CONCLUSIONS

The study highlights the challenges that journalists in Tanzania face, especially when it comes to data journalism at *Mwananchi* and *The Chanzo*. While journalists are somewhat familiar with data journalism, they struggle to use digital tools for data visualization effectively. This suggests that many journalists fall into the "early majority" category of the Diffusion of Innovations Theory, where they know about these tools but find it hard to adopt them fully due to issues like lack of training and technical skills.

This reluctance is linked to the challenges mentioned earlier, especially the difficulty and insufficient training related to data visualization tools.

The results show that while some journalists see the benefits of using data visualizations to improve the quality of their articles and engage readers, many are still unsure if these tools really work. This lack of proper use can hinder journalistic creativity and may drive away readers who prefer engaging visuals instead of dense text filled with numbers.

The study also shows that *Mwananchi* and *The Chanzo* take different approaches to data visualization. *Mwananchi*, being a more established and better-resourced outlet, uses visualizations more often and effectively. This indicates that they have stronger editorial policies that support data-driven storytelling, giving them an advantage in using data journalism effectively. On the other hand, *The Chanzo* seems to have difficulties incorporating visualizations, possibly due to fewer resources or a lack of focus on data journalism. This difference in approaches reveals how important resources, training, and a commitment to innovation are in shaping how well data journalism is practiced.

By tackling these challenges, the future of data journalism in Tanzania can improve. This would lead to better-informed audiences, greater journalistic integrity, and a stronger position in the fast-changing media world. Using data visualization as a key part of storytelling will not only enhance the articles produced but also keep readers interested in a more digital age.

RECOMMENDATION

Based on the study's findings, the researcher suggests several actionable recommendations for the Tanzanian journalism community. First, there is a need to implement comprehensive training programs for journalists. These programs should focus on improving skills in data journalism and the use of digital tools for data visualization. Specific tools like Piktochart, Flourish, and Datawrapper should be included in the training.

Another recommendation is to provide journalists with access to advanced data visualization tools. It is essential that journalists not only have these tools but also receive adequate training to use them effectively. Prioritizing user-friendly software will allow journalists to create engaging visual content that enhances their reporting and makes complex information easier for readers to understand.

The researcher also emphasizes the importance of fostering collaboration between journalists and data experts. Encouraging partnerships can help improve the quality and accuracy of data visualizations. Working together with data specialists will enable journalists to better understand the data they are dealing with and learn how to present it in a clear and impactful way, leading to more informed reporting.

Finally, increasing organizational support for data journalism is crucial. News organizations should allocate time and resources specifically for data journalism initiatives. This could involve creating dedicated roles for data journalists or data specialists and allowing journalists the flexibility to engage in data-driven projects without affecting their regular reporting tasks. By implementing these recommendations, Tanzanian journalists can improve their data journalism practices, resulting in higher quality reporting and better engagement with their audiences.

REFERENCES

- [1] Ambrosio, C. (2015). *Objectivity and Representative Practices across Artistic and Scientific Visualization*. DOI:10.4324/9780203066973-7
- [2] Bradshaw, P. (2019). *The data journalism handbook: Towards a critical data practice*. O'Reilly Media.
- [3] Chiumbu, S., & Munoriyarwa, A. (2023). Exploring data journalism practices in Africa: Data politics, media ecosystems and newsroom infrastructures. *Media, Culture & Society*, 45(2), 175-191. <https://doi.org/10.1177/01634437231100345>
- [4] Creswell, J. (2003). *Research design: Qualitative, quantitative, and mixed methods approaches* (2nd ed.). SAGE Publications.
- [5] Dowling, D., & Vogan, T. (2020). Data journalism and the regeneration of news: The impact of data on the news industry. *Journalism Studies*, 21(6), 867-883.
- [6] Engebretsen, M. (2017). *Vivid Diagrams and Zoomable Maps. Data Visualization as Innovative Form of Storytelling in Journalism*. Graphic Modes.
- [7] Hannaford, L. (2015). *Computational Journalism in the UK newsroom: hybrids or specialists?*. Journalism Education.
- [8] Kennedy, H., Weber, W., & Engebretsen, M. (2020). *Data visualization and transparency in the news*. https://eprints.whiterose.ac.uk/190046/1/10.1515_9789048543137-015.pdf
- [9] Knight, M., & Cook, C. (2018). *Data journalism: Inside the global future*. Routledge.
- [10] Lohner, J, Banjac, S and Neverla, I. (2016). *Journalistic practices, role perceptions ethics in democratisation conflicts*. https://eprints.whiterose.ac.uk/117301/1/Lohner%20Banjac%20Neverla%202016_Journalistic%20practices_findings%20from%20Egypt%20Kenya%20Serbia%20South%20Africa.pdf
- [11] Nukta Africa (2020). Reasons why we are investing in Data Journalism in Tanzania.
- [12] <https://nuktafrica.co.tz/reasons-why-we-are-investing-in-data-journalism-in-tanzania/>
- [13] Porter, T. (1996). *Trust in numbers: The pursuit of objectivity in science and public*.
- [14] Powell, R. (2019). *Data Journalism in Tanzania*. <https://blog.okfn.org/files/2019/03/Data-journalism-in-Tanzania-Open-Knowledge-International.pdf>
- [15] Rinsdorf, L. & Boers, R. (2016). *The need to Reflect: Data Journalism as an Aspect of Disrupted Practice in Digital Journalism and in Journalism Education*. Proceedings of the Roundtable Conference of the International Association of Statistics Education (IASE)
- [16] Rogers, S. (2016). *Facts are sacred: The power of data*. Guardian Books.
- [17] Simplilearn (2023). *What Is Data Collection: Methods, Types, Tools*. <https://www.simplilearn.com/what-is-data-collection-article>
- [18] Stalph, F. (2020). How journalists use data visualization in newsrooms: Insights from a German case study. *Journalism*, 21(4), 548-564.
- [19] Stonnes, A. (2020). *Data journalism: Principles and practices*. SAGE Publications
- [20] Tabary, C, Provost, A. & Trottier, A. (2016). *Data journalism's actors, practices and skills: A case study from Quebec*. https://www.researchgate.net/publication/281807571_Data_journalism's_actors_practices_and_skills_A_case_study_from_Quebec
- [21] Tal, A & Wansink, B. (2016). *Blinded with science: Trivial graphs and formulas increase ad persuasiveness and belief in product efficacy*. SAGE Publications