Zakat administration in times of COVID-19 pandemic in Indonesia: a knowledge discovery via text mining

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Abstract

Purpose – Zakat during the COVID-19 outbreak has played a vital role and has been significantly discussed in the virtual environment. Such information about zakat in the virtual world creates unstructured data, which contains important information and knowledge. This paper aims to discover knowledge related to zakat administration during the pandemic from the information in a virtual environment. Furthermore, the discussion is contextualised to the socio-economic debates.

Design/methodology/approach – This is a qualitative study operated via text mining to discover knowledge of zakat administration during the COVID-19 pandemic. The National Board of Zakat Republic of Indonesia (BAZNAS RI) is selected for a single case study. This paper samples BAZNAS RI's situation report on COVID-19 from its virtual website. The data consists of 40 digital pages containing 19,812 characters, 3,004 words and 3,003 white spaces. The text mining analytical steps are performed via RStudio. The following R packages, networkD3, igraph, ggraph and ggplot2 are used to run the Latent Dirichlet Allocation (LDA) for topic modelling.

Findings – The machine learning analysis via RStudio results in the 16 topics associated with the 3 primary topics (i.e. Education, Sadaqah and Health Services). The topic modelling discovers knowledge about BAZNAS RI's assistance for COVID-19 relief, which may help the readers understand zakat administration in times of the pandemic from BAZNAS RI's virtual website. This finding may draw the theory of socio-economic zakat, which explains that zakat as a religious obligation plays a critical role in shaping a Muslim community's social and economic processes, notably during the unprecedented times of COVID-19.

Research limitations/implications – This study uses data from a single zakat institution. Thus, the generalisation of the finding is limited to the sampled institution.

Practical implications – This research is both theoretically and practically important for academics and industry professionals. This paper contributes to the novelty in performing text mining via R in gaining knowledge about the recent zakat administration from a virtual website. The finding of this study (i.e. the topic modelling) is practically essential for zakat stakeholders to understand the contribution of zakat in managing the COVID-19 impacts.

Social implications – This work derives a theory of "socio-economic zakat" that explains the importance of a zakat institution in activating zakat for managing socio-economic issues during the pandemic. Thus,

This paper is entirely of the authors' work that does not represent any institution.

paying zakat to an authorised institution may actualise more maslahah (public interest) compared to paying it directly to the *asnaf* (zakat beneficiaries) without any measurement

Originality/value – This study is among the pioneers in gaining knowledge from Indonesia's zakat management during the COVID-19 outbreak via text mining. The authors' way of analysing data from the virtual website using RStudio can advance Islamic economics literature.

Keywords Text Mining, Indonesia, COVID-19, RStudio, Socio-economic Zakat

Paper type Research paper

1. Introduction

The novel coronavirus (i.e. COVID-19) has become a global pandemic since 11 March 2020. Millions of people have been infected and died from this virus. Such a deadly effect has caused massive consequences following control measures – such as large-scale social restrictions (e.g. PSBB in Indonesia) and other related terms like lockdown and movement control order (e.g. MCO in Malaysia) – have been implemented globally. The COVID-19 recession has become the primary consequence across the globe in managing the virus (Caraka *et al.*, 2020; Hudaefi and Beik, 2021).

In emerging economies like Indonesia, experts have predicted the worse impact of COVID-19 on the economies. Caraka *et al.* (2020) find the country's economic growth has declined in the first quarter of 2020, which confirms the report from Statistics Indonesia (BPS), informing a −2.19% growth in the fourth quarter of 2020 (year-to-year). During these unprecedented times of COVID-19, the role of *zakāh* (almsgiving) has been significant, particularly in managing socio-economic issues due to the control measures implementation (Hudaefi and Beik, 2021). In Indonesia, the National Board of Zakat (BAZNAS RI) has initiated an online platform (i.e. http://covid19.baznas.go.id/) that informs *zakāh* administration during the pandemic. Such information about *zakāh* in the virtual environment creates big data, which contains important knowledge that can shed new light on the related literature.

What knowledge can be discovered from such big data related to *zakāh* management during the pandemic? The existing studies on the topic of *zakāh* and COVID-19 have at least discussed two points; the global *zakāh* administration during the pandemic via written interview (Hudaefi *et al.*, 2020), and the lessons from digital *zakāh* campaign in social media via netnographic study (Hudaefi and Beik, 2021). At the time of this study, no significant attempt has been made to explore knowledge about *zakāh* administration from a virtual website. Against this backdrop, this paper aims to discover knowledge from *zakāh* administration in the virtual environment during the recent pandemic. This topic is theoretically important to understand how *zakāh* shapes a Muslim community's socio-economic processes during the pandemic.

To this end, the remaining part of this paper is organised as follows. Section 2 covers the literature review that conceptualises the role of *zakāh* in managing the pandemic impacts. Section 3 presents the research method and findings. Section 4 draws the discussion. Conclusion and recommendation are presented in the Section 5.

2. Literature review

Zakāh is the third of the five pillars of Islam that aims to purify a Muslim's wealth and redistributes the wealth to the poor and the needy (Abuznaid, 2009; Boonyamanond and Chaiwat, 2020; Choudhury, 1989; Djaghballou *et al.*, 2018; Sulistyowati, 2019; Yusoff *et al.*, 2019). *Zakāh* obliges a 2.5% payment from the Muslims' productive wealth when reaching the *niṣāb* (full ownership) and *haul* (one lunar year) (Bin-Nashwan *et al.*, 2020; Choudhury,

1989; Esa *et al.*, 2018; Raimi *et al.*, 2014). In *zakāh* agriculture, a 10% *zakāh* is required for agriculture products irrigated with rainwater and a 5% *zakāh* is charged other than that (Pratama and Yuni, 2020). Moreover, Islam requires *zakāh al-fiṭr* or *fiṭrah* that Muslims must pay before 'Āed al-Fiṭr (Islamic holy day). It is one ṣha' compulsory levy or an equivalent of 2.5 kilograms of rice, wheat, dates, sago or other staple food (Hudaefi and Beik, 2021).

The objects of *zakāh* in contemporary practice have been evolved, which Hafidhuddin (2002) classifies them into two (i.e. classic and contemporary *zakāh*). Classic *zakāh* includes *zakāh al-fiṭr*, *zakāh al-māl* (wealth) of 85 grams gold, *zakāh* on agriculture and *zakāh* on trading and business with *niṣāb* of 85 grams gold and meets the *haul*. Meanwhile, contemporary *zakāh* is any *ḥalāl* (allowed by Islamic law) wealth equals to the *niṣāb* of 85 grams of gold that is subject to a 2.5% *zakāh* when it reaches the *haul*. Such *zakāh* in the current practices, including; *zakāh* profession (monthly salary), corporate *zakāh*, *zakāh* on stocks and bonds and *zakāh* on Islamic investments (Hafidhuddin, 2002; Hudaefi and Beik, 2021; Talattov *et al.*, 2016).

2.1 Zakāh for poverty alleviation

Zakāh has been playing a substantial role in poverty alleviation in Muslim communities. Maulana *et al.* (2019) investigate the relation between *zakāh* collection and the reduction of Indonesia's poverty rate. They perform regression analysis using panel data from BAZNAS RI (from 2015 to 2018). It is explained that *zakāh* fund managed by BAZNAS RI positively relates to the decrease in the poverty rate during the observed period (Maulana *et al.*, 2019).

Furthermore, the productive strategy of *zakāh* distribution practised by *zakāh* institutions in Indonesia may draw how *zakāh* empowers vulnerable communities. Rizkiningsih *et al.* (2019) evaluate such distribution impact by sampling the number of 243 low-income households from across Indonesia who received *zakāh* in 2018. The analysis employs several welfare-benchmarks and finds that such scheme has increased the average income of the sampled households. This finding draws a critical issue of poverty in Indonesia which has been discussed by Dartanto *et al.* (2020), Dartanto and Nurkholis (2013), Dartanto and Otsubo (2013), Saputro and Sidiq (2020).

The contribution of *zakāh* empowerment scheme may be further understood when it is compared with other donations. For example, Husna and Nurzaman (2018) compare the assistance of *zakāh* fund with the non-*zakāh* funds distributed to a vulnerable community in Bukittingi of West Sumatera, Indonesia. *Zakāh* assistance is found to be more effective in improving the sample's welfare than non-*zakāh* aid.

2.2 Conceptualising the role of zakāh in managing COVID-19 impacts

It is understood that population health positively relates to economic welfare and growth (Bhargava *et al.*, 2001; Bloom *et al.*, 1998; Cuddington and Hancock, 1994; McKibbin and Fernando, 2020; Pritchett and Summers, 1996; Robalino *et al.*, 2002). Thus, the new virus outbreak must impact the economies, given the unpredicted shocks they cause (McKibbin and Fernando, 2020). The former virus emergences, such as HIV/AIDS, SARS epidemic, Ebola virus disease, influenza, among others, have been proven to degrow the economies (Caraka *et al.*, 2021; Djalante *et al.*, 2020; Lee and Mckibbin, 2004; McKibbin and Fernando, 2020; Schoenbaum, 1987; Smith *et al.*, 2005).

The *Sharī'ah* (Islāmic law) basis of *zakāh* draws the relevance of using *zakāh* for managing COVID-19 impacts. The Almighty Allah *subḥānahu wa ta'ālā* (Exalted and Glorified is He) in al-Qur'ān *Sūrah al-Tawbah* verse 60 mentioned the eight *aṣnāf* (beneficiaries) of *zakāh*. They are *fuqarā* (poor people), *masākīn* (needy), 'āmilīn (Muslims

who work managing *zakāh*), *muallaf* (Convert to Islām), *riqāb* (slaves), *ghārimīn* (people in debt), *fī Sabīlillāh* (Muslims strive to deliver the messages of Islām) and *ibn Sabīl* (travellers who financially troubled) (Alfaizin *et al.*, 2018; Asad Ibrahim *et al.*, 2014; Bin-Nashwan *et al.*, 2020). The *aṣnāf* of *fuqarā* and *masākīn,* which have been increasing during the pandemic, may ground the relevance of using *zakāh* for COVID-19 relief (Hudaefi and Beik, 2021). Besides, Indonesia's Council of Ulama (MUI) has issued a *fatwa* (legal opinion) No. 23 of 2020. The *fatwa* allows the use of *zakāh, infaq* and *sadaqah* for managing COVID-19 impacts.

2.2.1 Knowledge gaps and research questions. The existing studies about *zakāh* and COVID-19 at least have explored the role of *zakāh* in times of the pandemic and the practice of digital *zakāh* campaign. Hudaefi *et al.* (2020) use written interview to explain the global *zakāh* administration in two points; the importance of a *zakāh* institution in alleviating poverty before the pandemic and its role in assisting the governments in managing socio-economic problems during the outbreak. Furthermore, Hudaefi and Beik (2021) sample BAZNAS RI's social media posts (i.e. Facebook, Instagram, Twitter and YouTube) to gain knowledge from BAZNAS RI's virtual *zakāh* campaign during the pandemic. The study explains the theory of inclusive marketing derived from the sample's social media posts. It is explained that social media content's inclusivity is practically important to deliver the fundamental of *zakāh* as a religious obligation that brings financial and social benefits for humanity.

In line with Hudaefi and Beik (2021), this paper aims to gain knowledge from the virtual environment (e.g. virtual communication and information on websites). Such information in the virtual world has made up big data, creating research and analysis spaces (Felt, 2016; Tsou, 2015). The information on the internet has been widely used for data mining (i.e. knowledge discovery from large unstructured data using machine learning) (Chen *et al.*, 1996; Felt, 2016; Hand, 2007; Hand and Adams, 2015) and for digital ethnography or netnography studies (Hudaefi and Beik, 2021; Lohmeier, 2014). In Islamic finance research, Hudaefi (2020) uses Islamic financial technology (fintech) peer-to-peer (P2P) lending information in virtual websites. He discovers how such P2P firms' financing activities promote Sustainable Development Goals of the United Nation Development Programme (UNDP).

Furthermore, the role of Islamic finance and Islamic fintech in response to the COVID-19 recession has been addressed by Hassan *et al.* (2020). It is explained that Islamic finance and fintech have significant potential in promoting a more sustainable financial system after the pandemic. In line with this potential, Islam requires Muslims to perform obligatory and voluntary donations, which *zakāh* is one of them. The *zakāh* institution's role has been vital in activating *zakāh* that shapes a Muslim community's social and economic systems, including during the pandemic (Hudaefi and Beik, 2021). While research on *zakāh* has enormously discussed its role in poverty alleviation, a study that has discussed the topic of zakāh and COVID-19 remains scarce; moreover, such studies that discover knowledge from a virtual website.

Against the backdrop above, a research question is asked:

RQ1. What knowledge can be discovered from a virtual website related to *zakāh* administration in times of COVID-19 outbreak?

3. Research methods
This study used a qualitative research approach to answer the research question. The qualitative method benefits this study as it allows the author to characterise and identify a central phenomenon that the variables are unknown (Ali and AlQuradaghi, 2019; Alsarhan

and Valax, 2020; Baehaqi *et al.*, 2020; Creswell, 2012; Hudaefi and Heryani, 2019; Sakti *et al.*, 2016; Suyadi and Febriana Fauzi, 2020). That is, gaining knowledge from the *zakāh* administration during the COVID-19 outbreak needs an exploration. Thus, the qualitative approach best suits this study.

3.1 Answering research question via text mining

Furthermore, this paper used text mining approach to discover knowledge from a virtual website. The definition of text mining and algorithms involved in its execution has been ambiguous (Villarroel Ordenes and Zhang, 2019). However, it can be understood as a specialised form of data mining to extract information and discover knowledge from huge amounts of unstructured textual data (Cheerkoot-Jalim and Khedo, 2020; Usai *et al.*, 2018). Text mining is practically significant to generate new facts by categorising, clustering or visualising the unstructured data (Cheerkoot-Jalim and Khedo, 2020; Hashimi *et al.*, 2015; Hudaefi and Badeges, 2021; Usai *et al.*, 2018).

In Islamic economics research, Tlemsani *et al.* (2020) perform text mining to confirm the validity of the current practice of *murabaha* (cost plus profit) contract against its shariah (Islamic law) reasoning in the Quran and Hadith texts. In this study, the analytical steps of text mining, as explained by Cheerkoot-Jalim and Khedo (2020), Fleuren and Alkema (2015); Hudaefi and Badeges (2021); Usai *et al.* (2018), were engaged to discover knowledge from a virtual website. These steps are information retrieval (IR), information extraction, visualisation and knowledge discovery. BAZNAS RI was considered for a single case study. The data was collected from the document of the situation report on COVID-19 available on its website. Figure 1 illustrates the model of this study.

3.1.1 A single case study. A single case study was employed to understand *zakāh* administration in times of COVID-19 outbreak. A case study in Islamic economics research has been widely used (e.g. see more; Abdullah and Ab Rahman (2015), Alkhan and Hassan, (2020), Bodolica *et al.* (2020), Hachicha and Amar (2015); Hudaefi, Saoqi, *et al.* (2020); Hudaefi and Beik (2021), Hudaefi and Heryani (2019); Mücahit and Mervan (2021); Shome *et al.* (2018) to analyse either a social phenomenon or a fundamental issue arising in the practice of Islamic economics generally, and specifically in the fundamental issues of Islamic banking and finance.

In this study, BAZNAS RI was considered for a single case study to understand *zakāh* administration practices during the COVID-19 outbreak. BAZNAS RI is selected due to its
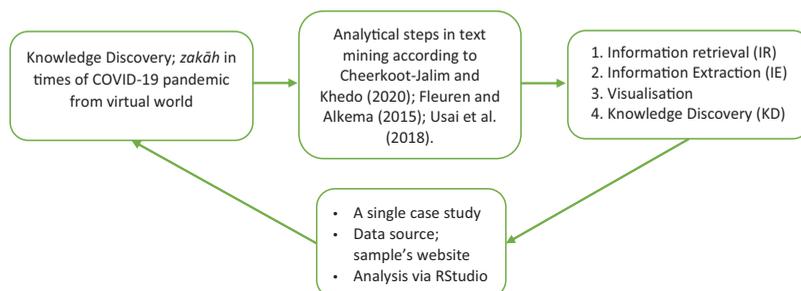

Source: Adapted from Hudaefi and Badeges (2021)

position as a leading *zakāh* institution in Indonesia. As such, its selection provides relevance in discovering knowledge from *zakāh* administration in times of the pandemic.

3.1.2 Data from Board of Zakat Republic of Indonesia. This work used data from BAZNAS RI's special report on COVID-19 called 'Situation Report' to discover knowledge from the virtual website. The document is available on its website (www.baznas.go.id). In general, the document contains information about *zakāh* distribution during the pandemic. The document provides information to help the authors discover knowledge related to *zakāh* administration during the pandemic.

At the time of this study, 40 documents of situation report on COVID-19 are available online. The document has been published since March 2020 and is written in Bahasa (Indonesian language). The latest document is report No. 40, which is published on 14 September 2020. For the analysis, this paper purposefully selected the latest document (i.e. No. 40), which contains 40 digital pages, 19,812 characters, 3,004 words and 3,003 white spaces. This report contains the information about Indonesia's *zakāh* administration during the pandemic.

3.1.3 Analysis using R. R is a free software environment for statistical computing and graphics (R Core Team, 2008). R is an open data system; therefore, the authors' work in analysing the textual data is easier to be audited quickly than that of thematic analysis via human intelligence (e.g. deductive, inductive and abductive reasoning of content analysis).

In Islamic economics researches, R software at least has been used for various application; including for regression analysis (Lee *et al.*, 2017; Sanchez, 2013; Sutiksno *et al.*, 2018), cluster analysis (Militino, 2010; Müllner, 2013), classification (Andrew, 2001; Caraka *et al.*, 2020; Sani *et al.*, 2018) and time series (Hornik, 2009; McLeod *et al.*, 2011; Suhartono *et al.*, 2019). In a specific context of *zakāh* studies, Nailah and Rusydiana (2020) use *R Biblioshiny* to evaluate the publication of scholarly articles of *zakāh*. The finding provides critical information about the development of *zakāh* literature. In this study, the authors' text mining analysis via RStudio was done with the following R programming codes;

```
  library(igraph)
  library(ggraph)
library(ggplot2)
wordnetwork <- head(df, 30)
wordnetwork <- graph_from_data_frame(df)
ggraph(wordnetwork, layout = "fr") +
  geom_edge_link(aes(width = df$KEYWORD, edge_alpha = df
$KEYWORD),
      edge_colour = "pink") +
geom_node_text(aes(label = name), col = "darkgreen", size = 4) +
theme_graph(base_family = "Arial Narrow") +
theme(legend.position = "none") +
labs(title = "Cooccurrences within 3 words distance",
    subtitle = "Nouns and Adjective")
netstat <- networkStat(wordnetwork)
summary(netstat, k = 10)
CS <- conceptualStructure(wordnetwork, method="MCA", field="df
$count",
              minDegree = 10, clust = 5, stemming=FALSE,
              labelsize = 8, documents = 20)
```

3.1.3.1 Information retrieval (IR). In this study, the IR step was done by selecting the data, translating it into English and pre-processing it in RStudio. The analysis was first done by

preparing the textual data from BAZNAS RI's report on COVID-19 via traditional Web scraping. The authors harvested the selected data by downloading the document purposefully. The data was further stored locally as a portable document format (*PDF*). The selected information was further translated into English and copied into a text document format (*txt*). Following this, data analytics and statistical analysis were performed using RStudio.

Furthermore, natural language processing (NLP) was executed to eliminate (or at least to reduce) the incorrect and inconsistent textual data (Caraka *et al.*, 2019; Newman *et al.*, 2010). The pre-processing had a significant influence on the data. A well-executed pre-processing stage would enable an improved processing performance. The numbers and symbols, fold case, stem and other items are removed (Campbell *et al.*, 2015; Canini *et al.*, 2009). At this stage, the data is ready for further extraction.

3.1.3.2 *Information extraction.* After information was retrieved from the data set and was pre-processed for cleaning purposes, the information was further extracted via clustering the words. The following formula is the logical framework of the analysis; $l_i = (A_i, A_2, \ldots, A_n)$, where the documents to i (l_i) has a distribution of the number of terms A_n. The bag-of-words vector that operates as the Latent Dirichlet Allocation (LDA) was employed to process the input corpus. The LDA process generates a subject model, which is the distribution of words across k-topics.

Figure 2 shows the model representation from machine learning provided by the LDA of $GK = (K_1, K_2, \ldots, K_m)$. The *GK* subject model represents the distribution of up to k topics. The value of k is a parameter that the operator can change. A good topic modelling for text clustering could reduce noise from similarity measurements and classify corpus grouping structures more accurately. The latent sense found in the document corpus can be discovered by modelling this subject.

3.1.3.3 *Visualisation using Latent Dirichlet Allocation (LDA).* The LDA model is a textual data probability model that can describe the relationship between terms and hidden semantic themes in the sampled document. The Bayesian approach was further used in the model to estimate parameters. The Bayesian approach produces an approximate value based on a posterior distribution. Since the estimation measurement of the posterior distribution in this model was complicated, Gibbs sampling estimation was used (Caraka *et al.*, 2020; Carlo, 2004; Koch, 2018; Rabinovich *et al.*, 2015). Thus, the estimation resulted in three labels; Education, Sadaqah and Health Services, as shown in Figure 3.

3.1.4 Knowledge discovery. Figure 3 visualises topic modelling via sankey diagram. The machine learning analysis via RStudio resulted in 16 topics associated with the 3 primary topics (i.e. Education, Sadaqah and Health Services). These topics can help us understand about *zakāh* administration in Indonesia during the COVID-19 outbreak, notably BAZNAS RI's distribution as informed in the sampled document. As Figure 3 illustrates, the thicker the flow, means, the more often the word occurs in the sampled document.

3.1.4.1 *Education.* There are two topics associated with education (i.e. community education and online learning). These topics may explain BAZNAS RI's contribution to managing COVID-19 impacts by providing education for the community and through online mode.

The information about community education can be found in the sampled document. It includes education for vulnerable communities about the virus prevention, the virus' adverse impacts on the environment and the society and coping with the COVID-19. The document also informs that BAZNAS RI volunteers urge the community to follow central and local government suggestions. Community-based education is targeted at all levels of society, including for children and the elderly. It is reported that such community-based education has covered at least 41,890 communities with a total amount of Rp2.5bn (US $174,000) distributed for such education.
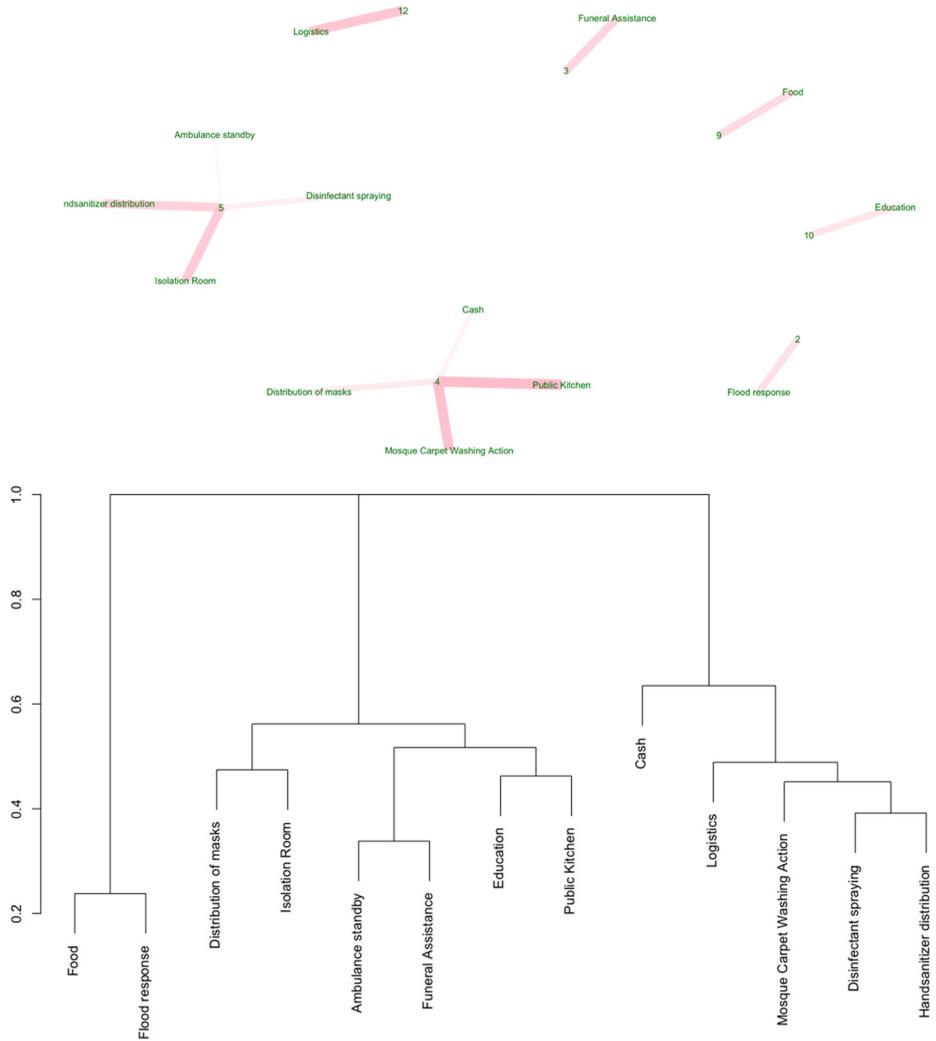
Figure 2.
Words cluster via
network graph and
dendrogram

Source: Author's analysis via R package *dendextend*

Furthermore, the topic modelling via LDA resulted in the online learning topic with a thicker flow than that of community education (see Figure 3). It means that the word online learning more often occurs than the word community education in the sampled document. The document tells BAZNAS RI has been conducted online learning daily since 7 March 2020. The online learning is done via BAZNAS RI's YouTube channel. The topics are varied, including religious talks, training for micro, small and medium enterprises (MSMEs), discussion with BAZNAS RI's volunteers and others.
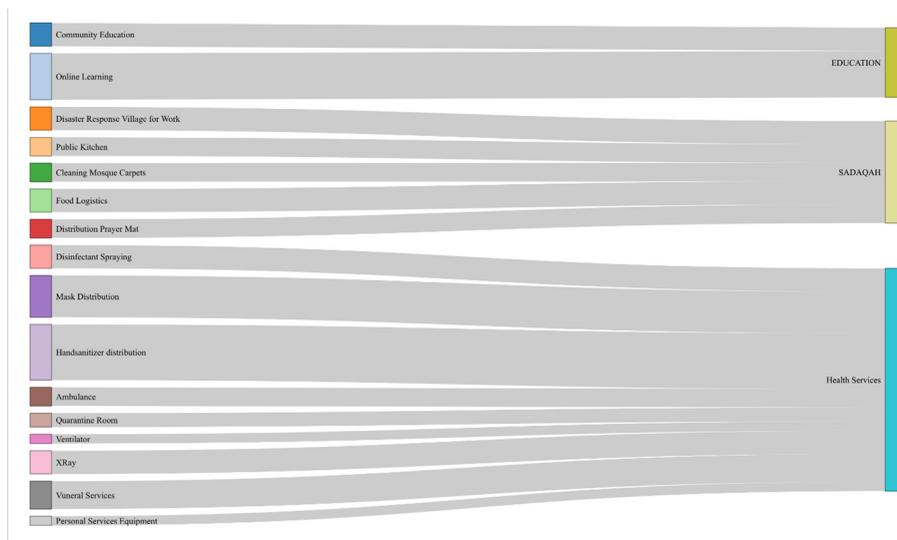
Source: Authors' analysis via R package *networkD3*

3.1.4.2 Sadaqah. *Sadaqah* means voluntary charity, which is fundamentally different from *zakāh* (i.e. mandatory). In the sampled document, the word *sadaqah* explains BAZNAS RI's activities in distributing the *sadaqah* funds for COVID-19 relief.

The topic modelling via LDA (Figure 3) resulted in the five topics that associate with *sadaqah*. They are; disaster response, public kitchen, cleaning mosque carpets, food logistics and distributing prayer mat. The flow of disaster response and food logistics are slightly thicker than the other three topics. That means the words disaster response and food logistics often occur than the other words in the same cluster (i.e. *sadaqah*). The sampled document informs the number of 16074 prayer mats or equals to Rp441.84m (US$30,000) and 594203 logistic food packages amounted to Rp14.22bn (US $989.4,000) were distributed for COVID-19 relief.

3.1.4.3 Health services. The machine learning analysis via LDA resulted in nine topics associated with health services. Those topics are; disinfectant spraying, mask distribution, hand sanitiser distribution, ambulance, quarantine room, ventilator, X-ray, funeral services and personal protective equipment (PPE). As Figure 3 illustrates, the flow of hand sanitiser distribution is the thickest, followed by mask distribution and X-ray. The degree of flows thickness represents the occurrence of those clustered words in the sampled document.

It is reported in the document the details of such distribution for the COVID-19 relief. Disinfectant spraying has been done at least in 60122 locations that equal to Rp9.6bn (US$668,000). The number of 1,251,461 masks, 186,699 packs of hand sanitiser and 222,451 PPE packages were distributed, amounted to Rp6.03bn (US$420,000), Rp4.02bn (US$278,000) and Rp25.32bn (US$1.8m) respectively.

4. Discussion
4.1 Theoretical and practical implications
The authors' text mining via RStudio, in which the result is visualised in Figure 3, has helped the authors address the research question. As presented in the previous section, the finding may provide theoretical and practical implications in the socio-economic debates.

The term socio-economics relates to the theory of human society emerging since the 1970s (Hellmich, 2017). Socio-economics is synonymous with new economic sociology, sociological economics, social and behavioural economics (Hellmich, 2017; Zafirovski, 2016). In scholarly works, socio-economics has been discussed in numerous fields. For example, business administration, economics, education, governance structure, law, women issues and others (Hayakawa and Venieris, 2019; Hellmich, 2017; Prasetyia, 2019; Ucal and Günay, 2019).

In *zakāh* related works, the term socio-economics at least has been addressed by Ariyani (2016); Mikail *et al.* (2017), Hossain *et al.* (2019) and Suprayitno *et al.* (2017). Hossain *et al.* (2019) argue that integrating *zakāh* into Islamic finance practices may draw the practice of *zakāh* in socio-economic development. Meanwhile, Mikail *et al.* (2017) investigate the utilisation of *zakāh* and waqf (Islamic endowment) to fund micro-*takāful* (Islamic insurance) services in Malaysia. This scheme may support the social securities and socio-economics of low-income families in the country.

In this study, *zakāh* contribution during the pandemic is evidenced from BAZNAS RI's virtual website. The finding may unequivocally suggest a practical implication of socio-economic *zakāh* during the COVID-19 outbreak. *Zakāh,* in that regard, may form as social protection, socio-economic development tool and social support as explained by Hossain *et al.* (2019) and Mikail *et al.* (2017). This idea may draw the socio-economic framework, which discusses the relationship among allocation, distribution, culture and preferences, as Keizer (2005) explained. Socio-economic *zakāh* may be theoretically understood that *zakāh*, a religious obligation, plays a critical role in shaping social and economic processes of a Muslim community, notably in times of the pandemic (i.e. in the context of this study).

In addition, the finding of this study suggests the sample's effort in activating *zakāh's* role in managing COVID-19 consequences in Indonesia. Thus, the theory of socio-economic *zakāh* further implies the importance of an institutionalised zakāh institution. On this ground, the authors hypothesise that *zakāh* may realise more *maṣlaḥah* (public interest) if it is paid formally through an authorised institution, compared to *zakāh* that is directly given to the beneficiaries without any measured output.

5. Conclusion
Returning to the authors' research question (i.e. What knowledge can be gained from a virtual website related to *zakāh* administration in times of COVID-19 outbreak?), the authors' text mining analysis using RStudio may answer this question. The machine learning analysis via RStudio resulted in the 16 topics modelling with the 3 primary topics that can help us understand *zakāh* distribution in times of the pandemic from a virtual environment. This study contributes to the novelty in several ways. It is among the pioneers in gaining knowledge from Indonesia's *zakāh* management during the COVID-19 outbreak via text mining. Future studies may refer to this work to perform the analytical steps in text mining via RStudio.

Furthermore, the topic modelling using LDA helps the authors draw the theory of socio-economic *zakāh* derived from the virtual website's information. This theory refers to *zakāh* as a religious obligation that shapes a Muslim community's social and economic systems, notably during the pandemic. This theory further implies the importance of zakāh institutions. *Zakāh* institution has been playing a critical role in activating *zakāh's* contribution to managing COVID-19 impacts. Thus, paying *zakāh* in an official and authorised institution may realise greater *maṣlaḥah* compared to individual informal distribution.

This study limits its generalisability and does not capture a specific aspect of the *zakāh* collection. It is interesting to study this topic to understand the trend of *zakāh* collection during the pandemic. Future studies may analyse the factors that influence the individuals

to either donate or pay *zakāh* formally during the outbreak. Future studies are also critical to further develop the theory of socio-economic *zakāh* by presenting more evidence from *zakāh* practices worldwide. In addition, the authors' hypothesis mentioning that *zakāh* contributes to actualising more *maṣlaḥah* (public interest) if it is paid formally through an authorised institution, demands an extensive investigation in future researches.

References

Abdullah, M.F. and Ab Rahman, A. (2015), "Is wa'dan any different to muwa'adah? Empirical evidence from Malaysia", *International Journal of Islamic and Middle Eastern Finance and Management*, Vol. 8 No. 3, pp. 310-328.

Abuznaid, S.A. (2009), "Business ethics in Islam: the glaring gap in practice", *International Journal of Islamic and Middle Eastern Finance and Management*, Vol. 2 No. 4, pp. 278-288.

Alfaizin, A.W., Insani, T.D. and Herianingrum, S. (2018), "Zakat: concept and implications to social and economic (economic tafsīr of al-tawbah:103)", *Journal of Islamic Monetary Economics and Finance*, Vol. 4 No. 1, pp. 117-132.

Ali, S.N. and AlQuradaghi, B.A. (2019), "Publishing Islamic economics and finance research: polemics, perceptions and prospects", *International Journal of Islamic and Middle Eastern Finance and Management*, Vol. 12 No. 3, pp. 346-367.

Alkhan, A.M. and Hassan, M.K. (2020), "How do takaful operators choose which model to adopt? A case study from the Kingdom of Bahrain", *Journal of Islamic Accounting and Business Research*, Vol. 11 No. 9, pp. 1677-1688.

Alsarhan, F. and Valax, M. (2020), "Conceptualization of wasta and its main consequences on human resource management", *International Journal of Islamic and Middle Eastern Finance and Management*, Vol. 14 No. 1, pp. 114-127.

Andrew, A.M. (2001), "An introduction to support vector machines and other kernel-based learning methods", *Kybernetes*, Vol. 30 No. 1, doi: 10.1108/k.2001.30.1.103.6.

Ariyani, N. (2016), "Zakat as a sustainable and effective strategy for poverty alleviation: from the perspective of a multi-dimensional analysis", *International Journal of Zakat*, Vol. 1 No. 1, pp. 88-106.

Asad Ibrahim, A., Jamal Elatrash, R. and Omar Farooq, M. (2014), "Hoarding versus circulation of wealth from the perspective of maqasid al-Shari'ah", *International Journal of Islamic and Middle Eastern Finance and Management*, Vol. 7 No. 1, pp. 6-21.

Baehaqi, A., Birton, M.N.A. and Hudaefi, F.A. (2020), "Time value of money in Islamic accounting practice: a critical analysis from maqāṣid al-Sharī'ah", *Journal of Islamic Accounting and Business Research*, Vol. 11 No. 9, pp. 2035-2052.

Bhargava, A., Jamison, D.T., Lau, L.J. and Murray, C.J.L. (2001), "Modeling the effects of health on economic growth", *Journal of Health Economics*, Vol. 20 No. 3, pp. 423-440.

Bin-Nashwan, S.A., Abdul-Jabbar, H., Aziz, S.A. and Haladu, A. (2020), "Zakah compliance behavior among entrepreneurs: economic factors approach", *International Journal of Ethics and Systems*, Vol. 36 No. 2, pp. 285-302.

Bin-Nashwan, S.A., Abdul-Jabbar, H., Aziz, S.A. and Sarea, A. (2020), "Zakah compliance in Muslim countries: an economic and socio-psychological perspective", *Journal of Financial Reporting and Accounting*, doi: 10.1108/JFRA-03-2020-0057.

Bloom, D.E., Sachs, J.D., Collier, P. and Udry, C. (1998), "Geography, demography, and economic growth in Africa", *Brookings Papers on Economic Activity*, Vol. 1998 No. 2, pp. 207-295.

Bodolica, V., Spraggon, M. and Saleh, N. (2020), "Innovative leadership in leisure and entertainment industry: the case of the UAE as a global tourism hub", *International Journal of Islamic and Middle Eastern Finance and Management*, Vol. 13 No. 2, pp. 323-337.

Boonyamanond, S. and Chaiwat, P. (2020), "Investigating zakat payment of thai Muslims", *Journal of Islamic Monetary Economics and Finance*, Vol. 6 No. 1, pp. 1-20.

Campbell, J.C., Hindle, A. and Stroulia, E. (2015), "Latent Dirichlet allocation: extracting topics from software engineering data", *The Art and Science of Analyzing Software Data*, Vol. 3, pp. 139-159.

Canini, K.R., Shi, L. and Griffiths, T.L. (2009), "Online inference of topics with Latent Dirichlet allocation", *Journal of Machine Learning Research*, Vol. 5 No. 1999, pp. 65-72.

Caraka, R.E., Lee, Y., Chen, R.C. and Toharudin, T. (2020), "Using hierarchical likelihood towards support vector machine: Theory and its application", *IEEE Access*, Vol. 8, pp. 194795-194807.

Caraka, R.E., Hafianti, S., Hidayati, S., Wilie, B. and Muztahid, M.R. (2019), "Identifying indicators of household indebtedness by provinces", *The Ninth Research Dive for Development on Household Vulnerability*, Jakarta, pp. 10-15.

Caraka, R.E., Lee, Y., Chen, R.C., Toharudin, T., Gio, P.U., Kurniawan, R. and Pardamean, B. (2021), "Cluster around latent variable for vulnerability towards natural hazards, Non-Natural hazards, social hazards in west Papua", *IEEE Access*, Vol. 9, doi: 10.1109/ACCESS.2020.3038883.

Caraka, R.E., Nugroho, N., Tai, S.-K., Chen, R.C., Toharudin, T. and Pardamean, B. (2020), "Feature importance of the aortic anatomy on endovascular aneurysm repair (EVAR) using Boruta and Bayesian MCMC", *Communications in Mathematical Biology and Neuroscience*, Vol. 2020, No. 1, doi: 10.28919/cmbn/4584.

Caraka, R.E., Lee, Y., Kurniawan, R., Herliansyah, R., Kaban, P.A., Nasution, B.I., Gio, P.U., *et al.* (2020), "Impact of COVID-19 large scale restriction on environment and economy in Indonesia", *Global J. Environ. Sci. Manage*, Vol. 6, pp. 65-84.

Carlo, M. (2004), "Markov chain Monte Carlo and Gibbs sampling", Notes, doi: 10.2174/157015909788848875.

Cheerkoot-Jalim, S. and Khedo, K.K. (2020), "A systematic review of text mining approaches applied to various application areas in the biomedical domain", *Journal of Knowledge Management*, Vol. 25 No. 3, doi: 10.1108/JKM-09-2019-0524.

Chen, M.S., Han, J. and Yu, P.S. (1996), "Data mining: an overview from a database perspective", *IEEE Transactions on Knowledge and Data Engineering*, doi: 10.1109/69.553155.

Choudhury, M.A. (1989), "The blending of religious and social orders in Islam", *International Journal of Social Economics*, Vol. 16 No. 2, pp. 13-45.

Creswell, J.W. (2012), "Educational research: Planning", *Conducting and Evaluating Quantitative and Qualitative Research 4th Edition*, Pearson, Boston.

Cuddington, J.T. and Hancock, J.D. (1994), "Assessing the impact of AIDS on the growth path of the Malawian economy", *Journal of Development Economics*, Vol. 43 No. 2, pp. 363-368.

Dartanto, T. and Nurkholis, (2013), "The determinants of poverty dynamics in Indonesia: evidence from panel data", *Bulletin of Indonesian Economic Studies*, Vol. 49 No. 1, pp. 61-84.

Dartanto, T. and Otsubo, S. (2013), "Measurements and determinants of multifaceted poverty: absolute, relative, and subjective poverty in Indonesia", *JICA Research Institute*, Vol. 54, pp. 1-52.

Dartanto, T., Moeis, F.R. and Otsubo, S. (2020), "Intragenerational economic mobility in Indonesia: a transition from poverty to the middle class in 1993–2014", *Bulletin of Indonesian Economic Studies*, Vol. 56 No. 2, pp. 193-224.

Djaghballou, C.E., Djaghballou, M., Larbani, M. and Mohamad, A. (2018), "Efficiency and productivity performance of zakat funds in Algeria", *International Journal of Islamic and Middle Eastern Finance and Management*, Vol. 11 No. 3, pp. 474-494.

Djalante, R. Lassa, J. Nurhidayah, L. Minh, H. Van, Mahendradhata, Y. and Ngoc, N.T. (2020), "The ASEAN's responses to COVID-19: a policy sciences analysis", PsyArXiv, No. February 2020, p. 368.

Esa, M.S.M., Noor, M.A.M. and Wahid, H. (2018), "Cadangan kodifkasi akta zakat nasional dan penubuhan majlis zakat negara", *Jurnal Ekonomi Malaysia*, Vol. 52 No. 1, pp. 145-156.

Felt, M. (2016), "Social media and the social sciences: how researchers employ big data analytics", *Big Data and Society*, Vol. 3 No. 1, doi: 10.1177/2053951716645828.

Fleuren, W.W.M. and Alkema, W. (2015), "Application of text mining in the biomedical domain", *Methods*, Vol. 74, pp. 97-106.

Hachicha, N. and Amar, A.B. (2015), "Does Islamic bank financing contribute to economic growth? The Malaysian case", *International Journal of Islamic and Middle Eastern Finance and Management*, Vol. 8 No. 3, pp. 349-368.

Hafidhuddin, D. (2002), *Zakat Dalam Perekonomian Modern*, Gema Insani, Jakarta.

Hand, D.J. (2007), "Principles of data mining", *Drug Safety*, Vol. 30, pp. 621-622.

Hand, D.J. and Adams, N.M. (2015), "Data mining", *Wiley StatsRef: Statistics Reference Online*, pp. 1-7.

Hashimi, H., Hafez, A. and Mathkour, H. (2015), "Selection criteria for text mining approaches", *Computers in Human Behavior*, Vol. 51, pp. 729-733.

Hassan, M.K., Rabbani, M.R. and Ali, M.A.M. (2020), "Challenges for the Islamic finance and banking in post COVID era and the role of fintech", *Journal of Economic Cooperation and Development*, Vol. 41 No. 3.

Hayakawa, H. and Venieris, Y.P. (2019), "Duality in human capital accumulation and inequality in income distribution", *Eurasian Economic Review*, Vol. 9 No. 3, pp. 285-310.

Hellmich, S.N. (2017), "What is socio-economics? An overview of theories, methods, and themes in the field", *Forum for Social Economics*, Vol. 46 No. 1, pp. 3-25.

Hornik, K. (2009), "Introductory time series with R, book", doi: 10.1007/978-0-387-88698-5.

Hossain, I., Muhammad, A.D., Jibril, B.T. and Kaitibie, S. (2019), "Support for smallholder farmers through Islamic instruments: the case of Bangladesh and lessons for Nigeria", *International Journal of Islamic and Middle Eastern Finance and Management*, Vol. 12 No. 2, pp. 154-168.

Hudaefi, F.A. (2020), "How does Islamic fintech promote the SDGs? Qualitative evidence from Indonesia", *Qualitative Research in Financial Markets*, Vol. 12 No. 4, pp. 353-366.

Hudaefi, F.A. and Badeges, A.M. (2021), "Maqāṣid al-Sharī'ah on Islamic banking performance in Indonesia: a knowledge discovery via text mining", *Journal of Islamic Marketing*, available at: https://doi.org/10.1108/JIMA-03-2020-0081

Hudaefi, F.A. and Beik, I.S. (2021), "Digital zakāh campaign in time of Covid-19 pandemic in Indonesia: a netnographic study", *Journal of Islamic Marketing*, Vol. 12 No. 3, pp. 498-517, doi: 10.1108/JIMA-09-2020-0299.

Hudaefi, F.A. and Heryani, N. (2019), "The practice of local economic development and maqāṣid al-Sharī'ah: evidence from a Pesantren in West Java Indonesia", *International Journal of Islamic and Middle Eastern Finance and Management*, Vol. 12 No. 5, pp. 625-642.

Hudaefi, F.A., Saoqi, A.A.Y., Junari, U.L. and Farchatunnisa, H. (2020), "Zakat and SDG 6: a case study of BAZNAS, Indonesia", *Journal of Islamic Monetary Economics and Finance*, Vol. 6 No. 4, pp. 239-258.

Hudaefi, F.A. Junari, U.L. Zaenal, M.H. Choirin, M. Rachmanto, I.B. and Ghani, A.R. (2020), "Zakat in time of COVID-19 pandemic: evidence from world zakat forum", BAZNAS Center of Strategic Studies, Jakarta, available at: https://puskasbaznas.com/publications/books/1406-zakat-in-time-of-covid-19-pandemic-evidence-from-world-zakat-forum (accessed 28 February 2021).

Husna, S. and Nurzaman, M.S. (2018), "The effectiveness of zakat funds towards the welfare of mustahik: a study on BAZNAS bukittinggi west sumatera", Jakarta, available at: https://puskasbaznas.com/publications/pwps/884-the-effectiveness-of-zakat-funds-towards-the-welfare-of-mustahik-a-study-on-baznas-bukittinggi-west-sumatera (accessed 30 April 2020).

Keizer, P. (2005), "A socio-economic framework of interpretation and analysis", *International Journal of Social Economics*, Vol. 32 Nos 1/2, pp. 155-173.

Koch, K.R. (2018), "Monte carlo methods", *GEM – International Journal on Geomathematics*, Vol. 9 No. 1, doi: 10.1007/s13137-017-0101-z.

Lee, J.-W. and Mckibbin, W.J. (2004), "Globalisation and disease: the case of SARS", *Asian Economic Papers*, Vol. 3 No. 1, pp. 113-131.

Lee, Y., Rönnegård, L. and Noh, M. (2017), "Data analysis using hierarchical generalized linear models with R, data analysis using hierarchical generalized linear models with R", doi: 10.1201/9781315211060.

Lohmeier, C. (2014), "The researcher and the never-ending field: reconsidering big data and digital ethnography", *Studies in Qualitative Methodology*, Vol. 13, pp. 75-89.

McKibbin, W. and Fernando, R. (2020), "The global macroeconomic impacts of COVID-19: seven scenarios", available at: www.brookings.edu/research/the-global-macroeconomic-impacts-of-covid-19-seven-scenarios/ (accessed 26 April 2020).

McLeod, A.I., Yu, H. and Mahdi, E. (2011), "Time series analysis with R", *Handbook of Statistics*, Vol. 30, pp. 1-75.

Maulana, I. Rizkiningsih, P. Zaenardi, A.K. Afandi, Y. Harmaini, H. and Ghanny, A.R. (2019), "Pengaruh zakat terhadap perekonomian makro Indonesia: Studi kasus badan amil zakat nasional (BAZNAS)", BAZNAS Center of Strategic Studies, Jakarta, available at: https://puskasbaznas.com/publications/books/1058-pengaruh-zakat-terhadap-perekonomian-makro-indonesia (accessed 30 April 2020).

Mikail, S.A., Ahmad, M.A.J. and Adekunle, S.S. (2017), "Utilisation of zakāh and waqf fund in micro-takāful models in Malaysia: an exploratory study", *ISRA International Journal of Islamic Finance*, Vol. 9 No. 1, pp. 100-105.

Militino, A.F. (2010), "Mixed effects models and extensions in ecology with R", *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, Vol. 173 No. 4, doi: 10.1111/j.1467-985x.2010.00663_9.x.

Mücahit, Ö. and Mervan, S. (2021), "A bibliometric analysis of the international journal of Islamic and Middle Eastern finance and management", *International Journal of Islamic and Middle Eastern Finance and Management*, doi: 10.1108/IMEFM-06-2020-0277.

Müllner, D. (2013), "Fastcluster: fast hierarchical, agglomerative clustering routines for R and python", *Journal of Statistical Software*, Vol. 53 No. 9, pp. 1-18.

Nailah, N. and Rusydiana, A.S. (2020), "The zakat and technology: a bibliometric R analysis", international journal of zakat", *BAZNAS Center of Strategic Studies*, Vol. 5 No. 3, pp. 88-107.

Newman, D., Baldwin, T., Cavedon, L., Huang, E., Karimi, S., Martinez, D., Scholer, F., *et al.* (2010), "Visualising search results and document collections using topic maps", *Journal of Web Semantics*, Vol. 8 Nos 2/3, pp. 169-175.

Prasetyia, F. (2019), "The role of local government policy on secondary school enrolment decision in Indonesia", *Eurasian Economic Review*, Vol. 9 No. 2, pp. 139-172.

Pratama, S.D. and Yuni, R.N. (2020), "Reducing poverty through optimisation of zakat on agricultural and profession", *International Journal of Islamic Economics and Finance (LJIEF)*, Vol. 3 No. 3, pp. 145-174.

Pritchett, L. and Summers, L.H. (1996), "Wealthier is healthier", *The Journal of Human Resources*, Vol. 31 No. 4, pp. 841-868.

R Core Team (2008), "R software", *R Foundation for Statistical Computing*.

Rabinovich, M. Angelino, E. and Jordan, M.I. (2015), "Variational consensus Monte Carlo", Advances in Neural Information Processing Systems.

Raimi, L., Patel, A. and Adelopo, I. (2014), "Corporate social responsibility, waqf system and zakat system as faith-based model for poverty reduction", *World Journal of Entrepreneurship, Management and Sustainable Development*, Vol. 10 No. 3, pp. 228-242.

Rizkiningsih, P. Astuti, A.D. Zaenardi, A.K. and Zaenal, M.H. (2019), "The role of zakat in improving mustahik welfare: Case of BAZNAS economic empowerment program", Jakarta, available at: https://

puskasbaznas.com/publications/pwps/1059-the-role-of-zakat-in-improving-mustahik-welfare-case-of-baznas-economic-empowerment-program (accessed 30 April 2020).

Robalino, D.A., Voetberg, A. and Picazo, O. (2002), "The macroeconomic impacts of AIDS in Kenya estimating optimal reduction targets for the HIV/AIDS incidence rate", *Journal of Policy Modeling*, Vol. 24 No. 2, pp. 195-218.

Sakti, M.R.P., Syahid, A., Tareq, M.A. and Mohd Mahdzir, A. (2016), "Shari'ah issues, challenges, and prospects for islamic derivatives: a qualitative study", *Qualitative Research in Financial Markets*, Vol. 8 No. 2, pp. 168-190.

Sanchez, G. (2013), "PLS path modeling with R", *R Package Notes*, available at: https://doi.org/citeulike-article-id:13341888.

Sani, N.S., Rahman, M.A., Bakar, A.A., Sahran, S. and Sarim, H.M. (2018), "Machine learning approach for bottom 40% households (B40) poverty classification", *International Journal on Advanced Science, Engineering and Information Technology*, Vol. 8 Nos 4/2, doi: 10.18517/ijaseit.8.4-2.6829.

Saputro, E.G. and Sidiq, S. (2020), "The role of zakat, infaq and shadaqah (ZIS) in reducing poverty in Aceh province", *International Journal of Islamic Economics and Finance (LJIEF)*, Vol. 3 No. 3, pp. 63-94.

Schoenbaum, S.C. (1987), "Economic impact of influenza. The individual's perspective", *The American Journal of Medicine*, Vol. 82 No. 6, pp. 26-30.

Shome, A., Jabeen, F. and Rajaguru, R. (2018), "What drives consumer choice of islamic banking services in the United Arab Emirates?", *International Journal of Islamic and Middle Eastern Finance and Management*, Vol. 11 No. 1, pp. 79-95.

Smith, R.D., Yago, M., Millar, M. and Coast, J. (2005), "Assessing the macroeconomic impact of a healthcare problem: the application of computable general equilibrium analysis to antimicrobial resistance", *Journal of Health Economics*, Vol. 24 No. 6, pp. 1055-1075.

Suhartono, S., Ashari, D.E., Prastyo, D.D., Kuswanto, H. and Lee, M.H. (2019), "Deep neural network for forecasting inflow and outflow in Indonesia", *Sains Malaysiana*, Vol. 48 No. 8, pp. 1798-1798.

Sulistyowati, S. (2019), "Designing integrated zakat-waqf models for disaster management", *Journal of Islamic Monetary Economics and Finance*, Vol. 4 No. 2, pp. 347-368.

Suprayitno, E., Suprayitno, E. and Harun, A. (2017), "Zakat and SDGs: impact zakat on human development in the five States of Malaysia", *International Journal of Zakat*, Vol. 2 No. 1, pp. 61-69.

Sutiksno, D.U., Gio, P.U., Caraka, R.E. and Ahmar, A.S. (2018), "Brief overview of STATCAL statistical application program", *Journal of Physics: Conference Series*, Vol. 1028, doi: 10.1088/1742-6596/1028/1/012244.

Suyadi, N., Z. and Febriana Fauzi, N.A. (2020), "The fiqh of disaster: the mitigation of Covid-19 in the perspective of Islamic education-neuroscience", *International Journal of Disaster Risk Reduction*, Vol. 51, pp. 101848.

Talattov, A.G., Sanusi, N.A., Kusairi, S. and Shaari, A.H. (2016), "The role of corporate zakat on optimal Capital structure policy: evidence from Malaysian firms", *Journal of Islamic Monetary Economics and Finance*, Vol. 1 No. 2, pp. 259-292.

Tlemsani, I., Marir, F. and Majdalawieh, M. (2020), "Screening of murabaha business process through quran and hadith: a text mining analysis", *Journal of Islamic Accounting and Business Research*, Vol. 11 No. 9, pp. 1889-1905.

Tsou, M.H. (2015), "Research challenges and opportunities in mapping social media and big data", *Cartography and Geographic Information Science*, Vol. 42 No. 1, pp. 70-74.

Ucal, M. and Günay, S. (2019), "Female employment status: a survey analysis of selected member states of the Arab league", *Eurasian Economic Review*, Vol. 9 No. 3, pp. 373-394.

Usai, A., Pironti, M., Mital, M. and Aouina Mejri, C. (2018), "Knowledge discovery out of text data: a systematic review via text mining", *Journal of Knowledge Management*, Vol. 22 No. 7, pp. 1471-1488.

Villarroel Ordenes, F. and Zhang, S. (2019), "From words to pixels: text and image mining methods for service research", *Journal of Service Management*, Vol. 30 No. 5, pp. 593-620.

Yusoff, M.N.H., Bin, Al Mamun, A., Ibrahim, M.D. and Hassan, H. (2019), "Measuring and comparing the functional business skills and knowledge of entrepreneurs: evidence from the asnaf community in Malaysia", *Journal of Economic Cooperation and Development*, Vol. 40 No. 2, pp. 1-24.

Zafirovski, M. (2016), "Toward economic sociology/socio-economics? Sociological components in contemporary economics and implications for sociology", *The American Sociologist*, Vol. 47 No. 1, pp. 56-80.

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