

Measuring the Ascending Trend for Sustainable Entrepreneurship: A Bibliometric Analysis

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Abstract: Entrepreneurship refers to initiating, organizing, and managing an innovative business to make a profit, while overcoming the financial threat. Sustainable entrepreneurship has attracted significant scholarly attention over the last decade, which states that there is an opportunity for generating new products, using new techniques that significantly reduce their social and environmental impacts. This study outlines the following research challenges and areas for future study, and provides bibliometric analyses for sustainable entrepreneurship. The data show that, notably, in the last two years, the quantity of publications and citations that get published has steadily increased. Bibliometric performance indicators identify the most productive and significant journals, countries, organizations, and individuals. This study tries to identify the essential publications in the field; the most frequently cited works, the top authors, and the top participating nations. The data were obtained from the Scopus database. Country and co-authorship network maps were designed using the VOS viewer program. This work advances our understanding of sustainable entrepreneurship and bibliometric methods, providing a more complete and trustworthy picture of this field.

Keywords: entrepreneurship, sustainable entrepreneurship, bibliometric analysis

JEL Classification: L26, L31, M21, Q01, Q56, F63, I25.

Introduction

A business enterprise, despite all its risks, must be created, organized, and managed to make it profitable:- this is called entrepreneurship. Creating new enterprises is a top goal for entrepreneurship (Abbasi et al., 2011; De Clercq et al., 2007; Ozkazanc-Pan, 2009). In economics, entrepreneurship that uses land, labor, natural resources, and capital can be profitable (Windapo, 2018). The entrepreneurial vision is characterized by experimentation and taking risks. It is a crucial element of a nation's capacity to prosper in a constantly evolving market, and it is becoming more competitive on a global scale (Nkongolo-Bakenda et al., 2006). Sustainability is the capacity to support or maintain a process consistently across time (Bota-Avram, 2022; Frangopol & Soliman, 2016; Windapo, 2018). Sustainability in business and policy strives to stop the loss of natural or physical resources so they can be used indefinitely (Djupdal & Westhead, 2015; Soto-Acosta et al., 2016). Sustainability includes economic, environmental, and social concepts (Anand et al., 2021).

Sustainable entrepreneurship is a cutting-edge research area incorporating the triple bottom line of economy, environment, and society. It is an economic activity that blends entrepreneurial activities with environmental and social sustainability (Frangopol & Soliman, 2016). Since entrepreneurship is the foundation of economies, researchers are constantly looking for ways to encourage it (Bota-Avram, 2022; Carl Folke, Thomas Hahn, Johan Rockstrom, 2009; Frangopol & Soliman, 2016; Mei et al., n.d.; Schaltegger & Wagner, 2011; Winn et al., 2011). Furthermore, sustainable entrepreneurship has been a research area of interest as people's understanding of the significance of social and environmental sustainability has grown (Schaltegger & Wagner, 2011; Terán-Yépez et al., 2020).

Entrepreneurship is considered, investigated, and is used to allow self-employment, which will result in financial rewards or as one of the means of establishing workplaces (B. Cohen & Winn, 2007; Emami & Khajeheian, 2018; Klewitz & Hansen, 2014; Raman et al., 2022; Satalkina, 2020). In simple words, entrepreneurship comes within the gamut of stimulating economic growth, showing the issues concerning society and the environmental things that are ignored (Greco & De Jong, 2017; Konys, 2019; Wu & Wu, 2008). The appearance of sustainable development, and the increasing emphasis on environmental issues by governments, non-governmental organizations (NGOs), scholars, and corporation's leads to some academics contention. Sustainable entrepreneurship must depend on more than just getting money (Dean & McMullen, 2007; Katsikis & Kyrgidou, 2007; Klewitz & Hansen, 2014; Raman et al., 2022; Tehseen & Ramayah, 2015). Furthermore, some academics believe entrepreneurship can push economic sectors toward long-term development (B. Cohen & Winn, 2007).

In the past ten years, it has been observed that social inequality and environmental destruction are problems that can only be solved with the help of business (Al Mamun

et al., 2016; Muñoz & Cohen, 2018). This drew the interest of academics that have connections with traditional enterprises, communities, and the environment, to develop a new form of entrepreneurial behaviour called sustainable entrepreneurship (Omar, 2021; Pierce et al., 2017; Taatila, 2010). As per the study, Shepherd and Patzelt (2011) stated that sustainable entrepreneurship aims to protect social, economic, and environmental structures. Furthermore, he said that to obtain more financial gains, one cannot damage society (Hanohov & Baldacchino, 2018; Shepherd et al., 2013; Shepherd & Patzelt, 2011). To ensure the welfare of future generations, sustainable entrepreneurship has been observed as an idea that reconstructs the development of economic, environmental, and social values (Bec et al., 2018; Escamilla-Fajardo et al., 2021).

As a result, some scholars started to focus more on the relationship between entrepreneurship and sustainable development, which gave rise to the idea of sustainable entrepreneurship, also known as sustainopreneurship (Terán-Yépez et al., 2020). The basis for sustainable entrepreneurship is the triple bottom line (TBL), which consists of three elements: the environment, which takes into account long-term protection and the reduction of adverse effects; social, which considers clients, stakeholders, partners, workers, and the center of the population; and the economy, which is dependent on economic performance (Belz & Binder, 2017; Bocken, 2015; Criado-Gomis et al., 2017; Frangopol et al., 2017).

To protect the environment and other resources, many businesses, along with the government, have made commitments (Doran & Larsen, 2016). However, few investors are interested in "green investments" or sustainable investments (Gulati & Weiler, 2021). Sustainable entrepreneurship is a viable solution rather than a significant contributor, to social inequality and environmental destruction (Al Mamun et al., 2016; Muñoz & Cohen, 2018). This simple truth caught the attention of scholars, who created a new form of economic venture called sustainable entrepreneurship. It can be sustained entrepreneurship by trying to connect with society, or it can be environmental, or even traditional entrepreneurship (Klewitz & Hansen, 2014; Konys, 2019; Schaltegger & Wagner, 2011; Terán-Yépez et al., 2020).

Theoretically, scholars have been paying more attention to sustainable entrepreneurship, which has resulted in the appearance of the unique topic in academic journals like the *Journal of Business Venturing*, *Greener Management International Journal*, *Sustainability*, and *International Journal of Entrepreneurial Behaviour & Research* (Afifi et al., 2016; da Silva Veiga et al., 2017).

The *Journal of Organizational Change Management* published the first article on sustainable entrepreneurship that is suitable for examining the evolution of this field of study. That article recognized the critical group of actors, such as country, association, and author to evaluate the past and offer potential directions for future research (Fran-

gopol et al., 2017). Over the past 10 years, academics, professionals, and organizations have given sustainable entrepreneurship a lot of attention. To the best of our knowledge, the previously released assessments have yet to comprehensively analyze the critical contributions or the primary research issues, or develop the research themes, which would have resulted in more clarity in this domain. This study performed a bibliometric analysis to close this knowledge gap.

By adopting this broad viewpoint and responding to various requests for more research into the subject areas, this paper seeks to systematize the scientific output on multiple domains. In this manner, it provides academics with a comprehensive assessment of the disjointed literature published up to this point and suggests potential directions for future research. In addition, policymakers and practitioners may discover a helpful starting point for encouraging the growth of entrepreneurial sustainability. In keeping with this, a bibliometric analysis with the following research questions has been performed:

1. Which subject area, publications, authors, countries, and articles have the most impact?
2. What is the recent rising research trend in sustainable entrepreneurship which might not yet have been explored in the various domains of study?
3. Which subjects regarding sustainable entrepreneurship have received the most research, and have been investigated most often?
4. How is information about sustainable entrepreneurship organized?

This study makes the following contributions: It provides a complete assessment of the literature on sustainable entrepreneurship research over the past 20+ years, together with the fundamental statistical indicators. We emphasize the most influential authors, papers, institutes, countries, and frequently cited publications. Additionally, by combining specific science mapping techniques, such as co-authorship analysis, and co-citation analysis and with the enhanced bibliometric method, a complete visual demonstration of the academic information relating to sustainable entrepreneurship can be obtained, such as the networks and clustering visualization.

Research Methodology

The purpose of this research is to trace the domain of sustainable entrepreneurship. The study provides data about the most influential publications, institutions, citation titles, nations, and publishers. For this bibliometric analysis, its research results can be a strong foundation for locating meaningful contributions in this sector, and trying to detect recent developments and recommendations for future research. In this research, a sample of

701 articles from Scopus between the years 2000 to 2022 was analysed. This research aims to provide an in-depth review of the existing published articles, by conducting a thorough bibliometric analysis of the research into sustainable entrepreneurship using a bibliometric software tool, such as VOSviewer.

Database And Method

We used the Scopus database to give a thorough map of sustainable entrepreneurship which is reliable due to the current advancements in bibliometric research. Investigating existing and new research trends in sustainable entrepreneurship is the primary goal of this review, which also identifies potential future research areas. The Scopus database was considered because it generates papers of the premium quality and is a trustworthy resource for indexing prestigious journals (Klewitz & Hansen, 2014; Terán-Yépez et al., 2020). Furthermore, the database was chosen because it has a significantly greater number of high-quality journals listed. As other researchers have noted, the accurateness of the search criteria for gathering information from the database has a significant impact on the trustworthiness of bibliometric research (Bota-Avram, 2022; Konys, 2019; Meerow & Newell, 2015; Most et al., 2018; Skute et al., 2017; Terán-Yépez et al., 2020).

The Scopus database was utilized to find publications about "Sustainable Entrepreneurship," "Sustainable Business Performance," "Sustainable Performance," and "Sustainable Business" that were published between 2000 and 2022. To guarantee the completeness of this search, these keywords were mentioned in the article, including titles, abstracts, and keywords. Only the articles that were present in the English language were considered, and the final sample articles were collected in comma-separated values (CSV) file formats for the bibliometric analysis software.

Table 1. Research Framework

Step No 1: Field of study	"Sustainable Entrepreneurship"
Step No 2: Database	"Scopus Database"
Step No 3: Research work	Article title, Abstract, Keywords
	"Sustainable Entrepreneurship," "Sustainable Development," "Business Development"
	Result Filtration = 701
	Between the Years 2000 to 2022

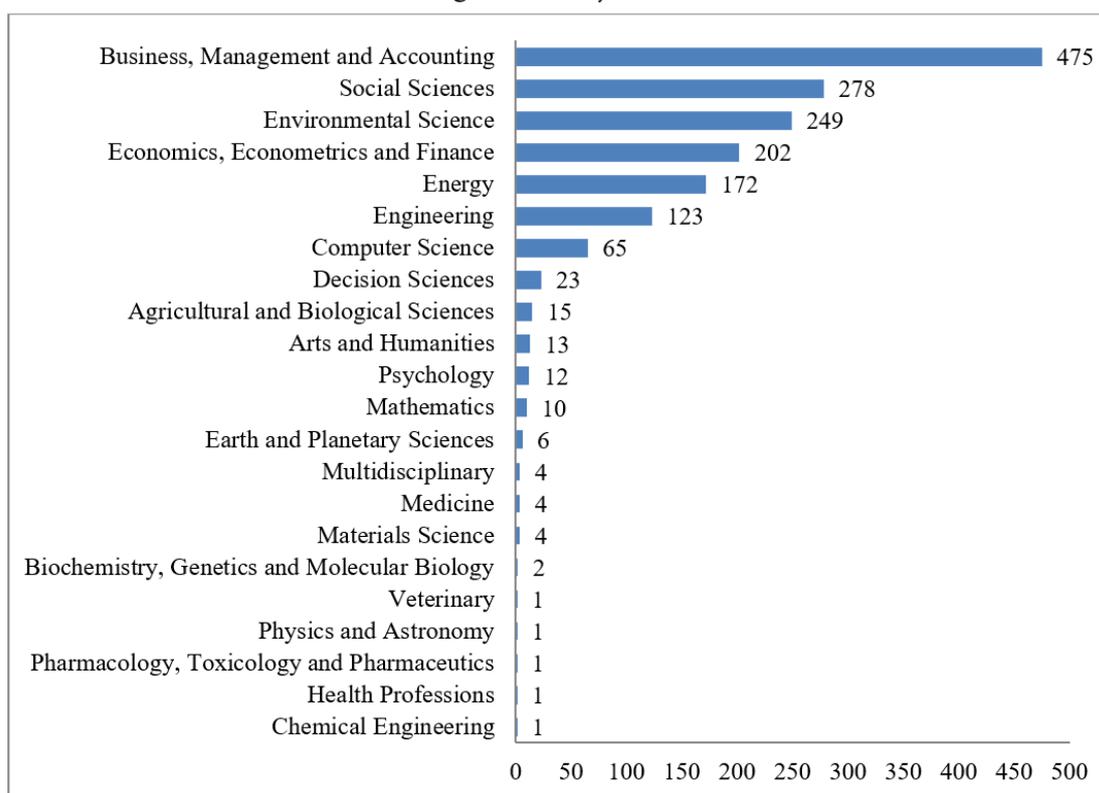
Step No 4: Analysis	Bibliometric Analysis	Visualization (VOS viewer)
	Subject area	Co-authorship network mapping
	Journal with maximum publication	Country-wise network mapping
	Year wise publication	
	Most cited papers	
	Most prolific authors	
	Most prolific countries	
Step No 5: Conclusion	Analysis	

During the search, it was observed that there were 701 articles on sustainable entrepreneurship. Further, to confirm the title, abstract, and keywords, each title was read by the authors. The categorization of the articles was provided based on the year-wise publication, subject area, most creative authors, journals with maximum publications, and most creative countries and most cited studies.

Results And Findings

Subject Area

From the overall publication on sustainable entrepreneurship, the most articles 475 were written about the subject area of business, management, and accounting. One of the articles on this subject had the most citation 845; this was titled "Sustainable Entrepreneurship and Sustainability Innovation: Categories and Interactions," which was published in the Journal of Business Strategy and the Environment. Subject areas such as social science and environment science had 278 and 249 studies, respectively. There were 202 studies on economics, econometrics, and finance, along with 172 studies into energy. Fewer studies have been done in the fields of engineering and computer science, with 123 and 65, respectively. Only one study per subject were published in veterinary, physics and astronomy, pharmacology, toxicology and pharmaceuticals, health professions, and chemical engineering.

Figure 1. Subject Area

(Source: Scopus Data Base)

Journals With Maximum Publications

The studies published on sustainable entrepreneurship belong to a variety of journals. The below-mentioned table shows the top 20 journals. These journals published the largest number of studies on sustainable entrepreneurship. Sustainability Switzerland published 91 articles. The Journal of Cleaner Production had 50 studies, and Business Strategy and the Environment published 30 studies. Furthermore, the journals such as the International Journal of Entrepreneurial Behaviour Research and Business Venturing have published 18 and 11 studies, respectively.

Table 2. Journals With Maximum Publications

Journal Name	Number of studies
Sustainability Switzerland	91
Journal Of Cleaner Production	50
Business Strategy And The Environment	30
International Journal Of Entrepreneurial Behaviour And Research	18
Journal Of Business Venturing	11
International Journal Of Entrepreneurial Venturing	9

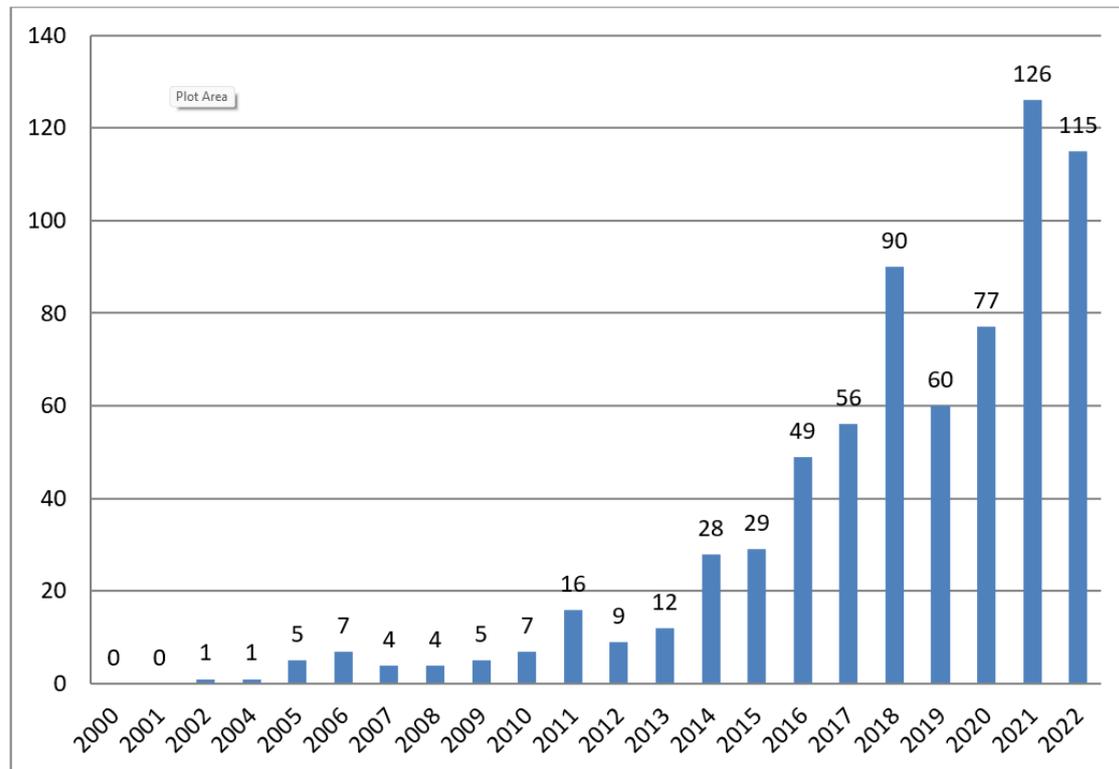
Organization And Environment	8
Small Business Economics	8
Entrepreneurship And Sustainability Issues	7
International Journal Of Entrepreneurship And Small Business	7
World Review Of Entrepreneurship Management And Sustainable Development	7
Journal Of Business Ethics	6
Administrative Sciences	5
Emerald Emerging Markets Case Studies	5
Environment Development And Sustainability	5
International Entrepreneurship And Management Journal	5
International Journal Of Management Education	5
Studies On Entrepreneurship Structural Change And Industrial Dynamics	5
World Journal Of Entrepreneurship Management And Sustainable Development	5
British Food Journal	4

(Source: Scopus Data Base)

Year Wise Publication

The number of studies published from 2000 to 2022 is shown in this table. There was evidence that the number of surveys on sustainable entrepreneurship has grown over time. From 2000 to 2013, the number of published studies was significantly reduced. The research series increased from 28 to 77 between 2014 and 2020, implying a significant increase in researchers' interests. Furthermore, the most prominent research has been published in the past five years. From 2019 to 2022, the number of studies increased from 60 to 115.

The maximum number of studies was published in 2021 (126 studies), which showed that the attention of research into the field has grown tremendously in recent times. In 2022, research done by Sadiq M. had the overall highest number of citations for that year; this was published in the China Finance Review International Journal. That same year, the second-highest number of citations was 25 for study by O'Neil, which was published in the Journal of Business Venturing.

Figure 2. Year-Wise Publications

(Source: Scopus Data Base)

Most Cited Paper

As per the data from Scopus, the 20 most cited studies are presented. It was noted that the most cited paper with 829 citations, was written by Schaltegger S. In his article, the author developed a new concept for sustainable entrepreneurship and its innovation (Schaltegger, Lüdeke-Freund, et al., 2016; Schaltegger & Wagner, 2011). The concept was built with sustainable entrepreneurship that could be widened by incorporating social entrepreneurship, which refers to using the entrepreneurial approach to accomplish social goals and changing market conditions related to sustainability's innovation. Furthermore, the concept could be used as a reference by managers who want to adopt sustainability's innovation and foster sustainable entrepreneurship (Johnson & Schaltegger, 2020; Schaltegger et al., 2018; Schaltegger, Hansen, et al., 2016; Schaltegger, Lüdeke-Freund, et al., 2016; Schaltegger & Wagner, 2011).

Another frequently cited paper was by Dean T.J., and; McMullen J.S. Their article showed how entrepreneurship could make it possible to address issues through the global socioeconomic system's relationship with the environment. While entrepreneurial literature maintains that market failure generates possibilities, environmental economics claims that market failure results in ecological degradation (Dean & McMullen, 2007; Mc-

mullen & Warnick, 2016; Winn et al., 2011).

The third most cited paper is by Cohen B. and, Winn M.I. According to their study, there were four market inadequacies: inefficient firms, asymmetric information, a faulty cost structure, and uncertainty. The study contributes to environmental degradation even while supplying enormous opportunities for the creation of cutting-edge innovations and business strategies (B. Cohen et al., 2008; P. R. Cohen & Levesque, 1990; Enoch, 2006; Frangopol et al., 2017; Mikami & Hinshaw, 2006; Winn et al., 2011).

Table 3. Most Cited Studies

Sr No.	Authors	Title	Year	Cited by
1	Schaltegger, S., Wagner, M.	Sustainable entrepreneurship and sustainability innovation: Categories and interactions	2011	829
2	Cohen, B., Winn, M.I.	Market imperfections, opportunity and sustainable entrepreneurship	2007	775
3	Dean, T.J., McMullen, J.S.	Toward a theory of sustainable entrepreneurship: Reducing environmental degradation through entrepreneurial action	2007	775
4	Hockerts, K., WÅstenhagen, R.	Greening Goliaths versus emerging Davids - Theorizing about the role of incumbents and new entrants in sustainable entrepreneurship	2010	649
5	Klewitz, J., Hansen, E.G.	Sustainability-oriented innovation of SMEs: A systematic review	2014	640
6	Shepherd, D.A., Patzelt, H.	The New Field of Sustainable Entrepreneurship: Studying Entrepreneurial Action Linking "What Is to Be Sustained" With "What Is to Be Developed"	2011	518
7	Schaltegger, S., Hansen, E.G., LÅdeke-Freund, F.	Business Models for Sustainability: Origins, Present Research, and Future Avenues	2016	467
8	Kuckertz, A., Wagner, M.	The influence of sustainability orientation on entrepreneurial intentions - Investigating the role of business experience	2010	378
9	Schaltegger, S., LÅdeke-Freund, F., Hansen, E.G.	Business Models for Sustainability: A Co-Evolutionary Analysis of Sustainable Entrepreneurship, Innovation, and Transformation	2016	312
10	Pacheco, D.F., Dean, T.J., Payne, D.S.	Escaping the green prison: Entrepreneurship and the creation of opportunities for sustainable development	2010	290
11	Young, W., Tilley, F.	Can businesses move beyond efficiency? The shift toward effectiveness and equity in the corporate sustainability debate	2006	247
12	Lans, T., Blok, V., Wesslink, R.	Learning apart and together: Towards an integrated competence framework for sustainable entrepreneurship in higher education	2014	227
13	Belz, F.M., Binder, J.K.	Sustainable Entrepreneurship: A Convergent Process Model	2017	222
14	Gast, J., Gundolf, K., Cesinger, B.	Doing business in a green way: A systematic review of the ecological sustainability entrepreneurship literature and future research directions	2017	211
15	Shepherd, D.A., Patzelt, H., Baron, R.A.	"I care about nature, but. disengaging values in assessing opportunities that cause harm	2013	178
16	Lordkipanidze, M., Brezet, H., Backman, M.	The entrepreneurship factor in sustainable tourism development	2005	169
17	Cohen, B., Smith, B., Mitchell, R.	Toward a sustainable conceptualization of dependent variables in entrepreneurship research	2008	162
18	Gibbs, D.	Sustainability entrepreneurs, ecopreneurs, and the development of a sustainable economy	2006	157
19	MuÅoz, P., Cohen, B.	Sustainable Entrepreneurship Research: Taking Stock and looking ahead	2018	153
20	Bocken, N.M.P.	Sustainable venture capital - Catalyst for sustainable start-up success?	2015	144

(Source: Scopus Data Base)

The fourth most cited paper was by Klewitz J. This paper evaluated the diverse image that research has created over the last 20 years, with an emphasis on innovative activities, including various kinds of sustainability-oriented innovations and strategic sustainability behavior of SMEs, using an interdisciplinary, systematic review that was undertaken between 1987 and 2010. The author visited significant research databases and conducted a bibliographic and thematic analysis of 84 essential journal articles. The author claims that the initial strategic behaviour of SMEs toward sustainability ranges from resistance to anticipatory, reactive, and innovation-based activity to sustainability-rooted conduct.

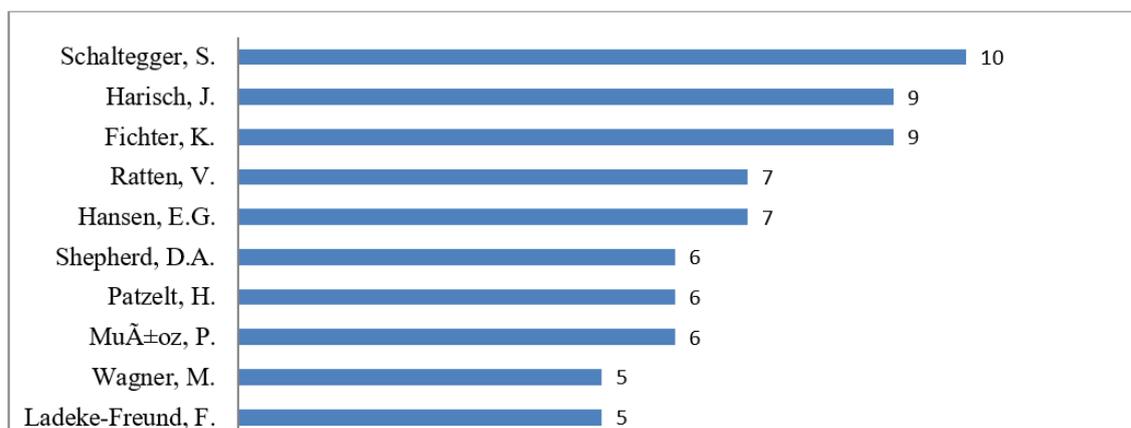
It also identified practices for organizational, process, and product innovation. Third, the results demonstrated that research was still primarily focused on eco-innovation as opposed to triple-bottom-line innovation (economic, social, and environmental dimensions), or SOIs of SMEs (Klewitz & Hansen, 2014; Schaltegger, Hansen, et al., 2016; Schaltegger, Lüdeke-Freund, et al., 2016).

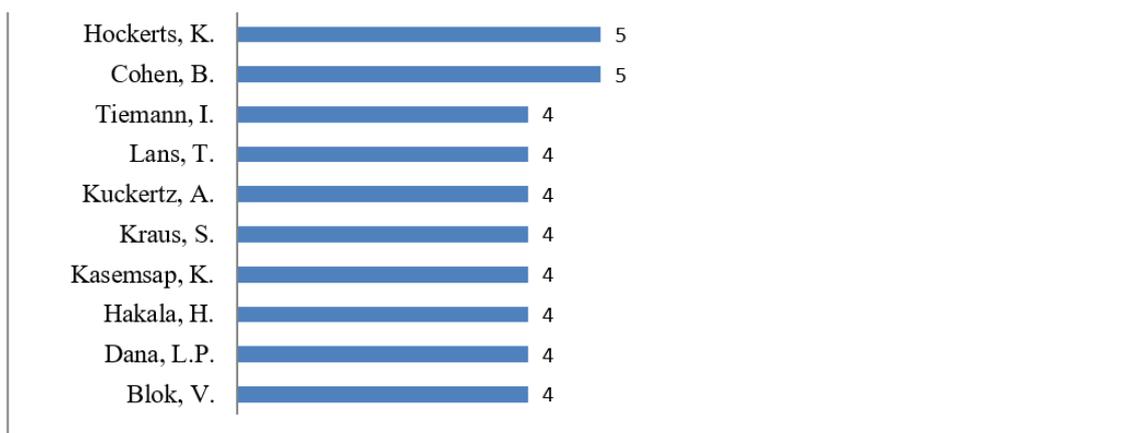
Most Prolific Authors

The study lists the 20 most creative authors. It has been observed that the most prolific author on sustainable entrepreneurship is Schaltegger, S, who has produced 10 research papers. The most cited paper by this author has 845 citations and was published in the Business Strategy and Environment Journal in 2011 (Schaltegger & Wagner, 2011). Another frequently cited paper has 488 citations and was published in the Organization and Environment Journal in 2016 (Frangopol & Soliman, 2016).

The third most cited paper by this author, which has been cited 324 times, was published in the Organization and Environment Journal in 2016. The next most prolific authors were Fichter, K, and Horsch, J with nine research papers each. Their most cited article was published in 2020 in the Journal of Cleaner Production (Breuer et al., 2018; Fichter & Tiemann, 2018).

Figure 3. Most Prolific Authors





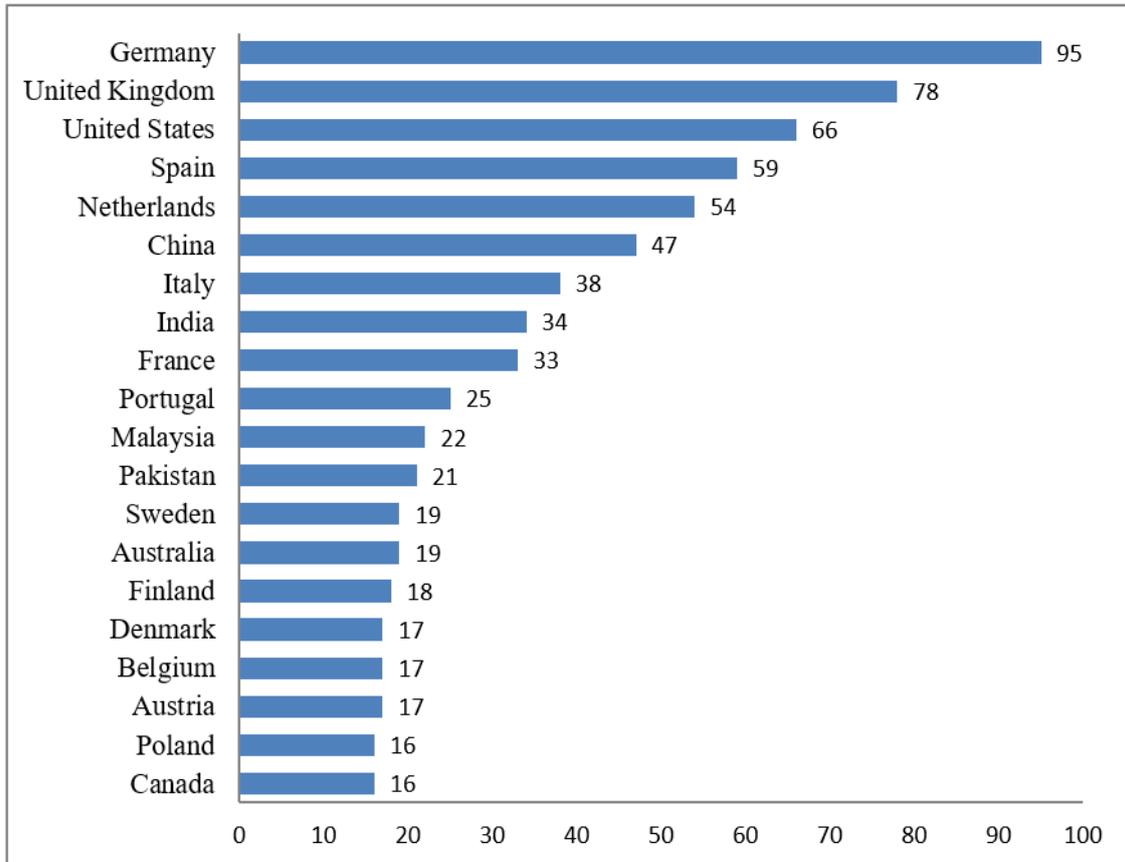
(Source: Scopus Data Base)

Most Prolific Countries

Germany (95), the United Kingdom (78), and the United States (66) were the top three countries with the highest number of articles publications about sustainable entrepreneurship. These countries have significantly contributed to the research output in the field, indicating their strong interest and engagement in sustainable entrepreneurship research. The data showed a substantial presence of European countries among the top contributors. Spain (59), the Netherlands (54), Italy (38), and France (33) were among the top countries, demonstrating Europe's commitment to sustainable entrepreneurship and its active involvement in research and publications related to the topic.

Asian countries, such as India (34), China (47), Malaysia (22), and Pakistan (21), have also made noteworthy contributions to the field. The study indicated the growing interest and involvement by Asian researchers in sustainable entrepreneurship research, reflecting the region's increasing focus on sustainability and entrepreneurship.

The data highlighted the dominance of European countries featuring among the top contributors. This further underscored the significance of sustainable entrepreneurship in European countries and the region's leadership in generating research into the topic. Several European countries, such as Austria, Belgium, Denmark, and Finland, have a similar number of publications (between 17 and 18); this suggests potential collaboration and knowledge exchange regarding sustainable entrepreneurship among these European nations.

Figure 4. Most Prolific Countries

(Source: Scopus Data Base)

Affiliations Of The Authors

The following table shows the affiliations of the authors. The maximum number of authors were affiliated with the Leuphana University of Lueneburg with 21 authors, which showed why authors from Germany, have done more studies into sustainable entrepreneurship. Furthermore, universities such as the Technical University of Munich and the University of Oldenburg have 12 and 11, respectively. Ten authors were from the University of Oldenburg and the University of Beira Interior. Most of the studies have been done in German, Portuguese, Finnish, and Spanish institutions. Most studies in Germany were carried out in institutions based outside Berlin.

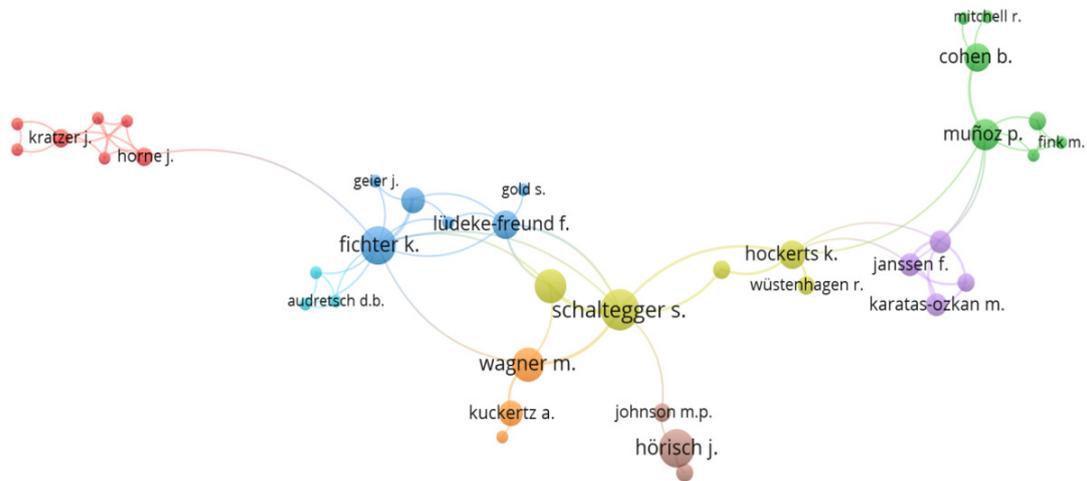
Table 4. Affiliations of the authors

Sr. No.	Affiliations	Country Name	No of Articles
1	Leuphana University of Lueneburg	Germany	21
2	Technical University of Munich	Germany	12
3	University of Oldenburg	Germany	11
4	University Beira Interior	Portugal	10
5	LUT University	Finland	10
6	Technische Universitat Berlin	Berlin	9
7	University de Valencia	Spain	8
8	Wageningen University & Research	Netherlands	8
9	Vrije University Amsterdam	Netherlands	8
10	University Politacnica de Valancia	Spain	8
11	University Utrecht	Netherlands	7
12	Universidad de Almera	Spain	7
13	Copenhagen Business School	Denmark	7
14	Borderstep Institute for Innovation and Sustainability	Germany	6
15	La Trobe University	Australia	6
16	Cz stochowa University Of Technology	Poland	6
17	Julius-Maximilians-University Warzburg	Germany	6
18	University of Hamburg	Germany	6
19	Grenoble Ecole de Management	France	6
20	University of Liverpool Management School	England	6

(Source: Scopus Data Base)

Co-Authorship Network Mapping

The co-authorship connectivity map created by the VOS viewer software is shown here. The image is composed of large and small circles linked by several lines. Authors who have already collaborated with other authors are shown by bigger circles and labels. Furthermore, the figure demonstrates the names of the authors who have collaborated the most with other authors in the data set. Eight clusters were formed in the database. Clusters 1 and 2 each have seven authors. In addition, the other clusters have five or six, or three authors.

Figure 5. The obtaining fintech dataset process

(Source: VOS viewer)

Country Wise Network Mapping

The figure shows the country-wise detailed network map created with the VOS viewer software. The authors from different countries who have co-authored with other authors are assigned circles and labels. The figure shows the names of the country, which had the greatest number of authors in the data set. In the database, 11 clusters were formed. Clusters 1 and 2 consist of 10 countries each. Furthermore, the other clusters have nine or seven, or eight countries.

study had identified reputable journals and conference proceedings that are published in scopus database. The results enable researchers and practitioners to access critical sources for comprehensive and impactful studies.

Furthermore, we pinpointed prolific authors such as Schaltegger, Cohen, Dean, and Hockerts, who have contributed significantly to the literature on sustainable entrepreneurship. Recognizing these influential authors can aid in identifying potential collaborators and mentors, facilitating knowledge transfer, and promoting interdisciplinary research. Geographically, our study revealed the countries that have actively contributed to sustainable entrepreneurship research, such as Germany, the United Kingdom, the United States, Spain and the Netherlands. This information is valuable for policymakers and funding agencies seeking to support and foster research efforts in specific regions. Additionally, we determined the articles with the highest citation counts, indicating their widespread influence on the academic community. These highly cited articles serve as essential references for researchers and provide critical insights into the foundational concepts and ideas for sustainable entrepreneurship.

The second research question delved into identifying recent emerging trends in research into sustainable entrepreneurship that have not yet been explored extensively in previous studies. By analyzing the publication trends over time, we detected novel themes and areas of interest that gained momentum in the later years of our study period (from 2018 to 2022). These emerging trends include but are not limited to circular economy business models, green technology entrepreneurship, sustainable supply chain management, and the role of sustainable entrepreneurship in addressing social inequalities. These nascent research areas offer promising avenues for future investigation and policy intervention as they reflect contemporary concerns and challenges related to sustainable development and entrepreneurship. Scholars and practitioners can effectively leverage these insights to address pressing environmental and social issues.

The third research question sought to identify the subjects that have received the most research attention and investigation into sustainable entrepreneurship. Our bibliometric analysis identified vital themes such as business, management, accounting, social sciences, environment science, economics, econometrics and finance, engineering, and computer science journals that have been extensively studied and the results published. These subjects include sustainable business models, corporate social responsibility, eco-innovation, green marketing, and social entrepreneurship for sustainability. return on assets in the sample period, but the lag of FIN was a negative sign.

The final research question explored how information about sustainable entrepreneurship organized in the academic literature. Our bibliometric analysis revealed common patterns and structures in the literature, such as frequently cited references, networks of co-cited articles and authors, and clusters of related keywords. Understanding the organization of information on sustainable entrepreneurship can assist researchers in navigating the vast body of literature, identifying influential works, and tracking the flow of ideas and research collaborations over time.

This knowledge promotes a more efficient and comprehensive exploration of the existing literature and facilitates the integration of various perspectives in future studies. A thorough understanding of global research into sustainable entrepreneurship and its distribution across subject fields, publications, nations, institutions, and authors is also available to junior and senior researchers. It is significant because it clarifies how corporations and academic researchers continuously expand their knowledge. Finally, this study may be helpful to academics who are already researching this subject, because it makes several recommendations for new areas of investigation.

Conclusion

In conclusion, a bibliometric study on sustainable entrepreneurship provides a comprehensive and up-to-date analysis of the scholarly output in this emerging field. By examining the data extracted from Scopus from 2000 to 2022, we have addressed four research questions that shed light on various aspects of sustainable entrepreneurship. Our study's multidimensional approach to exploring sustainable entrepreneurship research is significant. Unlike previous bibliometric studies, which often focused on either entrepreneurship or sustainability in isolation, we concentrated specifically on the intersection of both fields. This unique perspective allows us to uncover distinct trends, themes, and collaborations characteristic of sustainable entrepreneurship.

The study's objectives are to represent the state of the sustainable entrepreneurship discipline, identify important themes, and identify future research challenges using bibliometric analysis. This work has added to the knowledge about sustainable entrepreneurship and enhanced earlier literature studies. Diverse subject areas have access to sustainable entrepreneurship-specific literature.

However, Scopus was chosen over the other primary database because it contains nearly 84% of the articles in WoS and has more indexed journals than WoS (Klewitz & Hansen, 2014; Terán-Yépez et al., 2020). By choosing Scopus, the chance of missing documents during the search is decreased. Since the investigators determined study periods, the study periods used in the strategic diagrams may also influence the outcomes.

Choosing keywords that can directly influence the study's findings is one of its limitations, as with other bibliometric analyses. However, as we have demonstrated, sustainable entrepreneurship is recognized as a distinct concept that distinguishes it from related ideas. The idea of sustainable entrepreneurship has evolved in recent years to the point that several terms are associated. Choosing one database over another can also lead to limitations because the samples may vary.

This study observes the maximum number of studies related to sustainable entrepreneurship is in Business, Management, and Accounting, with 475 studies. An ultimate paper on sustainable entrepreneurship was published in 2021 with 134 publications. Most of the articles are posted by German authors, resulting in 88 documents in Scopus. The most prolific writers include Schaltegger, Lens, Parayannis, Muoz, and Cohen (Johnson & Schaltegger, 2020; Schaltegger, Hansen, et al., 2016; Schaltegger, Lüdeke-Freund, et al., 2016; Schaltegger & Wagner, 2011). Cohen, Schaltegger, and Wagner are the authors who have contributed the most to the growth of sustainable entrepreneurship research.

The three primary contributing nations are firstly Germany; secondly, the United Kingdom, and thirdly the United States, with a high range of clusters of a growing universal collaboration related to sustainable entrepreneurship research. The study concludes that sustainable entrepreneurship research is a growing trend because the number of publications and citations has increased exponentially over the past ten years. The rise of professional journals, the publication of special issues in very well journal articles, the existing demand for more research, and the increasing significance accorded by different factors such as companies and education institutions are just a few reasons for the enhanced interest in sustainable entrepreneurship.

The study will be beneficial to Managers and entrepreneurs. The comprehensive review of stakeholders, including the author, institution, and country, is constantly increasing to use the management lessons from this study. This review makes it simple to find references that will help them better understand sustainable entrepreneurship. Managers may also gain an idea of managerial interest. For example, they can learn how agents attempt to assist businesses by understanding various phenomena linked to sustainable entrepreneurship.

Managers might observe, for instance, that studies are being conducted to determine why workers' cognitive validity influences how attractive sustainable enterprises are to customers and how sustainable businesses might draw managerial talent. Furthermore, those who see that research is now being performed to understand better the founders of sustainable firms can use this research and how these practices ensure a sustainable entrepreneurial orientation in their businesses. These research findings sought to comprehend how numerous sectors of the economy enforce the transformation from a traditional to a sustainable business model.

Future research agendas for new and experienced researchers in this field should include a more detailed analysis of the relationship between corporate social responsibility and environmental performance in sustainable development, green human resource management practices, and the advantages of ecological performance for businesses. Another critical area for future research is the industry and innovative technology. In addition, economic and social outcomes and other topics like developing nations and different chances or opportunities for young people are known. However, other subjects, such as sustainable management and business, human resources, etc., require additional research.

Furthermore, it would be beneficial to expand the database coverage and consider a broader range of literature sources in future studies to ensure a more comprehensive analysis. Additionally, exploring the perspectives of practitioners and policymakers through surveys or interviews could provide further insights into the practical implications of sustainable entrepreneurship research. Our bibliometric study is a valuable foundation for scholars and practitioners seeking to advance knowledge and foster sustainable entrepreneurship to address global challenges and promote a more sustainable future.

References

- Abbasi, M. H., Siddiqi, A., & Azim, R. U. A. (2011). Role Of Effective Communications For Enhancing Leadership And Entrepreneurial Skills In University Students. *International Journal of Business and Social Science*, 2(10), 9. <http://search.proquest.com/docview/904512718?accountid=48385>
- Affi, T. D., Merrill, A. F., & Davis, S. (2016). The theory of resilience and relational load. *Personal Relationships*, 23(4), 663–683. <https://doi.org/10.1111/pere.12159>
- Al Mamun, A., Binti Che Nawati, N., Dewiendren, A. A., & Fazira Binti Shamsudin, S. F. (2016). Examining the Effects of Entrepreneurial Competencies on Students' Entrepreneurial Intention. *Mediterranean Journal of Social Sciences*, 7(2), 119–127. <https://doi.org/10.5901/mjss.2016.v7n2p119>
- Anand, A., Argade, P., Barkemeyer, R., & Salignac, F. (2021). Trends and patterns in sustainable entrepreneurship research: A bibliometric review and research agenda. *Journal of Business Venturing*, 36(3), 106092. <https://doi.org/10.1016/j.jbusvent.2021.106092>
- Bec, A., Moyle, B., & Moyle, C. L. (2018). Resilient and sustainable communities. *Sustainability (Switzerland)*, 10(12), 1–16. <https://doi.org/10.3390/su10124810>
- Belz, F. M., & Binder, J. K. (2017). Sustainable Entrepreneurship: A Convergent Process Model. *Business Strategy and the Environment*, 26(1), 1–17. <https://doi.org/10.1002/bse.1887>
- Bocken, N. M. P. (2015). Sustainable venture capital - Catalyst for sustainable start-up

- success? *Journal of Cleaner Production*, 108, 647–658. <https://doi.org/10.1016/j.jclepro.2015.05.079>
- Bota-Avram, C. (2022). Bibliometric analysis of sustainable business performance: where are we going? A science map of the field. *Economic Research-Ekonomiska Istrazivanja*, 0(0), 1–40. <https://doi.org/10.1080/1331677X.2022.2096094>
- Breuer, H., Fichter, K., Lüdeke-Freund, F., & Tiemann, I. (2018). Sustainability-oriented business model development: Principles, criteria and tools. *International Journal of Entrepreneurial Venturing*, 10(2), 256–286. <https://doi.org/10.1504/IJEV.2018.092715>
- Carl Folke, Thmas Hahn, Johan Rockstom, H. O. (2009). Resilience and Sustainable Development 2.0-A report by Stockholm Resilience Centre produced for the Swedish Government's Commission on Sustainable Development. *Stockholm Resilience Centre*, March. https://www.stockholmresilience.org/download/18.53ee94ff132ea99552880003257/1459560213637/Resilience_report_for_SCSD_31march2009.pdf
- Cohen, B., Smith, B., & Mitchell, R. (2008). Toward a sustainable conceptualization of dependent variables in entrepreneurship research. *Business Strategy and the Environment*, 17(2), 107–119. <https://doi.org/10.1002/bse.505>
- Cohen, B., & Winn, M. I. (2007). Market imperfections, opportunity and sustainable entrepreneurship. *Journal of Business Venturing*, 22(1), 29–49. <https://doi.org/10.1016/j.jbusvent.2004.12.001>
- Cohen, P. R., & Levesque, H. J. (1990). Intention is choice with commitment. *Artificial Intelligence*, 42(2–3), 213–261. [https://doi.org/10.1016/0004-3702\(90\)90055-5](https://doi.org/10.1016/0004-3702(90)90055-5)
- Criado-Gomis, A., Cervera-Taulet, A., & Iniesta-Bonillo, M. A. (2017). Sustainable entrepreneurial orientation: A business strategic approach for sustainable development. *Sustainability (Switzerland)*, 9(9), 1–20. <https://doi.org/10.3390/su9091667>
- da Silva Veiga, H. M., Demo, G., & Neiva, E. R. (2017). *The psychology of entrepreneurship. In Organizational Psychology and Evidence-Based Management: What Science Says about Practice* (pp. 135–155). https://doi.org/10.1007/978-3-319-64304-5_8
- De Clercq, D., Hessels, J., & Van Stel, A. (2007). Knowledge spillovers through FDI and trade and entrepreneurs' export orientation. *Academy of Management Proceedings*. <https://doi.org/10.5465/ambpp.2007.26523103>
- Dean, T. J., & McMullen, J. S. (2007). Toward a theory of sustainable entrepreneurship: Reducing environmental degradation through entrepreneurial action. *Journal of Business Venturing*, 22(1), 50–76. <https://doi.org/10.1016/j.jbusvent.2005.09.003>
- Djupdal, K., & Westhead, P. (2015). Environmental certification as a buffer against the liabilities of newness and smallness: Firm performance benefits. *International*

- Small Business Journal: Researching Entrepreneurship*, 33(2), 148–168. <https://doi.org/10.1177/0266242613486688>
- Doran, R., & Larsen, S. (2016). The Relative Importance of Social and Personal Norms in Explaining Intentions to Choose Eco-Friendly Travel Options. *International Journal of Tourism Research*, 18(2), 159–166. <https://doi.org/10.1002/jtr.2042>
- Emami, A., & Khajeheian, D. (2018). Social norms and entrepreneurial action: The mediating role of opportunity confidence. *Sustainability (Switzerland)*, 11(1). <https://doi.org/10.3390/su11010158>
- Enoch, M.-A. (2006). Genetic and environmental influences on the development of alcoholism: Resilience vs. risk. In *Annals of the New York Academy of Sciences* (Vol. 1094, pp. 193–201). Blackwell Publishing Inc. <https://doi.org/10.1196/annals.1376.019>
- Escamilla-Fajardo, P., Parra-Camacho, D., & Núñez-Pomar, J. M. (2021). Entrepreneurship and resilience in Spanish sports clubs: A cluster analysis. *International Journal of Environmental Research and Public Health*, 18(10). <https://doi.org/10.3390/ijerph18105142>
- Fichter, K., & Tiemann, I. (2018). Factors influencing university support for sustainable entrepreneurship: Insights from explorative case studies. *Journal of Cleaner Production*, 175, 512–524. <https://doi.org/10.1016/j.jclepro.2017.12.031>
- Frangopol, D. M., Dong, Y., & Sabatino, S. (2017). Bridge life-cycle performance and cost: analysis, prediction, optimisation and decision-making. *Structure and Infrastructure Engineering*, 13(10), 1239–1257. <https://doi.org/10.1080/15732479.2016.1267772>
- Frangopol, D. M., & Soliman, M. (2016). Life-cycle of structural systems: recent achievements and future directions. *Structure and Infrastructure Engineering*, 12(1), 1–20. <https://doi.org/10.1080/15732479.2014.999794>
- Greco, A., & De Jong, G. (2017). campus fryslân centre for sustainable entrepreneurship Sustainable entrepreneurship: definitions, themes and research gaps. Working Paper Series. www.rug.nl/cf/cse
- Gulati, B., & Weiler, S. (2021). Risk, recessions and resilience: towards sustainable local labor markets through employment portfolio analysis. *Sustainability (Switzerland)*, 13(14), 1–20. <https://doi.org/10.3390/su13147926>
- Hanohov, R., & Baldacchino, L. (2018). Opportunity recognition in sustainable entrepreneurship: an exploratory study. *International Journal of Entrepreneurial Behaviour and Research*, 24(2), 333–358. <https://doi.org/10.1108/IJEBr-12-2015-0275>
- Johnson, M. P., & Schaltegger, S. (2020). Entrepreneurship for Sustainable Development: A Review and Multilevel Causal Mechanism Framework. *Entrepreneurship: Theory and Practice*, 44(6), 1141–1173. <https://doi.org/10.1177/1042258719885368>
- Katsikis, I. N., & Kyrgidou, L. P. (2007). The concept of sustainable entrepreneurship: A
-

- conceptual framework and empirical analysis. *Academy of Management Proceedings*. <https://doi.org/10.5465/ambpp.2007.26530537>
- Klewitz, J., & Hansen, E. G. (2014). Sustainability-oriented innovation of SMEs: A systematic review. *Journal of Cleaner Production*, 65, 57–75. <https://doi.org/10.1016/j.jclepro.2013.07.017>
- Konys, A. (2019). Towards sustainable entrepreneurship holistic construct. *Sustainability (Switzerland)*, 11(23). <https://doi.org/10.3390/su11236749>
- Mcmullen, J. S., & Warnick, B. J. (2016). Should We Require Every New Venture to Be a Hybrid Organization? *Journal of Management Studies*, 53(4), 630–662. <https://doi.org/10.1111/joms.12150>
- Meerow, S., & Newell, J. P. (2015). Resilience and Complexity A Bibliometric Review and Prospects for Industrial Ecology. *Journal of Industrial Ecology*, 19(2). <https://doi.org/10.1111/jiec.12252>
- Mei, H., Ma, Z., Jiao, S., Chen, X., Lv, X., & Zhan, Z. (n.d.). The Sustainable Personality in Entrepreneurship : The Relationship between Big Six Personality , Entrepreneurial Self-Efficacy , and Entrepreneurial Intention in the Chinese Context. *Sustainability, MDPI*, 9(9), 5–8. <https://doi.org/10.3390/su9091649>
- Mikami, A. Y., & Hinshaw, S. P. (2006). Resilient adolescent adjustment among girls: Buffers of childhood peer rejection and attention-deficit/hyperactivity disorder. *Journal of Abnormal Child Psychology*, 34(6), 825–839. <https://doi.org/10.1007/s10802-006-9062-7>
- Most, F., Conejo, F. J., & Cunningham, L. F. (2018). Bridging past and present entrepreneurial marketing research: A co-citation and bibliographic coupling analysis. *Journal of Research in Marketing and Entrepreneurship*, 20(2), 229–251. <https://doi.org/10.1108/JRME-11-2017-0049>
- Muñoz, P., & Cohen, B. (2018). Sustainable Entrepreneurship Research: Taking Stock and looking ahead. *Business Strategy and the Environment*, 27(3), 300–322. <https://doi.org/10.1002/bse.2000>
- Nkongolo-Bakenda, J. M., Anderson, R., Ito, J., & Garven, G. (2006). Globally oriented small- and medium-sized enterprises: In search of an integrative framework and competitive determinants. *International Journal of Globalisation and Small Business*, 1(4), 374–392. <https://doi.org/10.1504/IJGSB.2006.012186>
- Omar, K. M. (2021). Measuring the Entrepreneurship Characteristics and Its Impact on Entrepreneurial Intentions. *Open Journal of Business and Management*, 09(02), 672–687. <https://doi.org/10.4236/ojbm.2021.92035>
- Ozkazanc-Pan, B. (2009). *Globalization and identity formation: A postcolonial analysis of the international entrepreneur*. In Dissertation Abstracts International Sec-

- tion A: Humanities and Social Sciences (Vol. 70, Issues 6-A). scholarworks.umass.edu. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=psyc6&NEWS=N&AN=2009-99231-130>
- Pierce, P., Ricciardi, F., & Zardini, A. (2017). Smart cities as organizational fields: A framework for mapping sustainability-enabling configurations. *Sustainability (Switzerland)*, 9(9), 1–21. <https://doi.org/10.3390/su9091506>
- Raman, R., Subramaniam, N., Nair, V. K., Shivdas, A., Achuthan, K., & Nedungadi, P. (2022). Women Entrepreneurship and Sustainable Development: Bibliometric Analysis and Emerging Research Trends. *Sustainability (Switzerland)*, 14(15). <https://doi.org/10.3390/su14159160>
- Satalkina, L. (2020). Digital Entrepreneurship and its Role in Innovation Systems : A Systematic Literature Review as a Basis for Future Research Avenues for Sustainable Transitions. *Sustainability*, 12(7), <https://doi.org/10.3390/su12072764>
- Schaltegger, S., Beckmann, M., & Hockerts, K. (2018). Collaborative entrepreneurship for sustainability. Creating solutions in light of the UN sustainable development goals. *International Journal of Entrepreneurial Venturing*, 10(2), 131–152. <https://doi.org/10.1504/IJEV.2018.092709>
- Schaltegger, S., Hansen, E. G., & Lüdeke-Freund, F. (2016). Business Models for Sustainability: Origins, Present Research, and Future Avenues. *Organization and Environment*, 29(1), 3–10. <https://doi.org/10.1177/1086026615599806>
- Schaltegger, S., Lüdeke-Freund, F., & Hansen, E. G. (2016). Business Models for Sustainability: A Co-Evolutionary Analysis of Sustainable Entrepreneurship, Innovation, and Transformation. *Organization and Environment*, 29(3), 264–289. <https://doi.org/10.1177/1086026616633272>
- Schaltegger, S., & Wagner, M. (2011). Sustainable entrepreneurship and sustainability innovation: Categories and interactions. *Business Strategy and the Environment*, 20(4), 222–237. <https://doi.org/10.1002/bse.682>
- Shepherd, D. A., & Patzelt, H. (2011). The New Field of Sustainable Entrepreneurship: Studying Entrepreneurial Action Linking “What Is to Be Sustained” With “What Is to Be Developed.” *Entrepreneurship: Theory and Practice*, 35(1), 137–163. <https://doi.org/10.1111/j.1540-6520.2010.00426.x>
- Shepherd, D. A., Patzelt, H., & Baron, R. A. (2013). "I care about nature, but. disengaging values in assessing opportunities that cause harm. *Academy of Management Journal*, 56(5), 1251–1273. <https://doi.org/10.5465/amj.2011.0776>
- Skute, I., Zalewska-kurek, K., Hatak, I., & Weerd-nederhof, P. (2017). Mapping the field : a bibliometric analysis of the literature on university – industry collaborations. *The Journal of Technology Transfer*. <https://doi.org/10.1007/s10961-017-9637-1>
- Soto-Acosta, P., Cismaru, D. M., Vătănescu, E. M., & Ciochină, R. S. (2016). Sustaina-
-

- ble entrepreneurship in SMEs: A business performance perspective. *Sustainability (Switzerland)*, 8(4), 1–12. <https://doi.org/10.3390/su8040342>
- Taatila, V. P. (2010). Learning entrepreneurship in higher education. *Education and Training*, 52(1), 48–61. <https://doi.org/10.1108/00400911011017672>
- Tehseen, S., & Ramayah, T. (2015). Entrepreneurial competencies and smes business success: The contingent role of external integration. *Mediterranean Journal of Social Sciences*, 6(1), 50–61. <https://doi.org/10.5901/mjss.2015.v6n1p50>
- Terán-Yépez, E., Marín-Carrillo, G. M., Casado-Belmonte, M. del P., & Capobianco-Urriarte, M. de las M. (2020). Sustainable entrepreneurship: Review of its evolution and new trends. *Journal of Cleaner Production*, 252. <https://doi.org/10.1016/j.jclepro.2019.119742>
- Windapo, A. (2018). Entrepreneurial factors affecting the sustainable growth and success of a South African construction company. *Sustainability (Switzerland)*, 10(4). <https://doi.org/10.3390/su10041276>
- Winn, M., Kirchgeorg, M., Griffiths, A., Linnenluecke, M. K., & Gunther, E. (2011). Impacts from climate change on organizations: A conceptual foundation. *Business Strategy and the Environment*, 20(3), 157–173. <https://doi.org/10.1002/bse.679>
- Wu, S., & Wu, L. (2008). The impact of higher education on entrepreneurial intentions of university students in China. *Journal of Small Business and Enterprise Development*, 15(4), 752–774. <https://doi.org/10.1108/14626000810917843>

Malaysian Government-Linked Companies and Earnings Management: The Interaction Effects of Internal and External Audit Governance Mechanisms on Earnings Management

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Abstract: This study aims to investigate the interactions between the audit governance mechanisms, such as the audit committee (AC), internal audit function (IAF), and external auditors (EA), and earnings management (EM) in Malaysia's government-linked companies (GLCs). It is one of the first papers to explore the complementary impact of external and internal corporate governance mechanisms on EM. This study used regression analysis on 340 firm-year-based observations with Malaysian GLCs available on the Bursa Malaysia main board during the period from 2009 to 2018. This study found that the interaction between the AC and the IAF is significantly and negatively correlated with EM. Similarly, the interaction between EA and the IAF negatively affects EM. However, the relationship between the AC and the EA interaction in lowering EM is negligible. One of the main conclusions of this study is that, in addition to ensuring the IAF's competency, the management of GLCs should establish and support the IAF, because of its critical position in assisting the roles of the AC and EA in minimizing opportunities for EM. The study provides empirical data on the effectiveness of the audit governance systems in Malaysian GLCs, which can aid the government, regulator, and other interested parties in their efforts to increase the GLCs' contributions to achieving orderly social and economic development in Malaysia.

Keywords: earnings management, government-linked companies, corporate governance, interaction effects

JEL Classification: M41, M42, M48

Introduction

Corporate governance in Malaysia's GLCs has come under increased scrutiny due to recent reports of financial irregularities within these organizations. These businesses include Lembaga Tabung Angkatan Tentera (LTAT), Felda Group, Tabung Haji, and 1Malaysia Development Berhad (1MDB), all of whose financial irregularities have resulted in significant financial losses for the Malaysian people (Khor, 2018). Menon (2018) has noted that there have been numerous significant bailouts of GLCs in recent years, with a potential cumulative value of up to RM85 billion. These financial irregularities are attributable to poor corporate governance (Eusoff, 2018), ineffective regulatory bodies (Haat, Rahman, and Mahenthiran 2008), agency conflict between owners and managers (Zgarni, Hlioui, and Zehri 2016), and the phenomenon of EM (Goncharov, 2005).

Most studies into EM practices in Malaysia focus on the top publicly listed companies (Rahman and Ali, 2006; Al-Absy, Ismail, and Chandren, 2019; Mohammad and Wasiuzzaman, 2020); few focus on GLCs. Using data from 2000 to 2013, Selahudin and Nawang (2015) found that Malaysian GLCs engaged in more EM practices, compared to non-GLCs. Nonetheless, GLCs have been transformed into prominent national institutions, and the majority have become well-known corporate entities at the regional level. The GLCs contribute to a substantial portion of the economic structure within Malaysia, with about 36% of Bursa Malaysia's market capitalization and 5% of the country's workforce (Menon and Ng, 2013). Therefore, it is very important to look into the topic of EM of Malaysia's GLCs in order to see whether the companies' financial performance is affected by their corporate governance practices.

Prior research recognizes the critical role played by internal bodies – the AC and IAF – and by external bodies – the EA – in forming governance mechanisms that help to achieve high quality financial reporting. The main board has delegated power to the AC to offer more reliability and accuracy in financial statements. The IAF and EA are both responsible for supporting the AC's primary role, which is to achieve better quality financial reporting (Al-Rassas and Kamardin 2015). The Institute of Internal Auditors (2017) has mentioned that the IAF has a crucial role in enhancing impactful governance within a company. This, therefore, has an important impact on the overall integrity and credibility of financial reporting. Based on the International Standards Auditing (ISA) -200, the primary goal of an audit is to establish its explicit perspective on financial statements (IFAC 2019). Zgarni et al. (2016) mentioned that the most prominent goal of external and internal corporate governance actors is to establish a higher overall financial reporting quality. Therefore, the primary interaction among these actors is essential for satisfying this goal.

There is a lack of research investigating the complementary impact of external and internal governance's functionality or mechanisms on EM (Davidson, Goodwin-Stewart,

and Kent, 2005; Al-Rassas and Kamardin, 2015). Davidson, Goodwin-Stewart, and Kent (2005) investigated the impacts of the board, the AC, EA and IAF on EM for 434 Australian companies. Al-Rassas and Kamardin (2015) explored the impacts of the AC, EA and IAF on EM using Malaysian-listed companies from 2009 to 2012. However, these studies have treated the AC, IAF and EA as independent monitoring mechanisms with regard to EM. Alves (2013) stated that it is not likely that they work individually in the corporate framework. Zgarni, Hlioui, and Zehri (2016) suggested that analyzing the overall governance system seems more practical, by simultaneously examining the complementary effects of these corporate governance functionalities. Therefore, it is crucial to investigate the interaction effects of these three parties, to assess whether they are complementary to each other in reducing opportunistic management behavior.

Limited research has been conducted to investigate the impact of corporate governance mechanisms on Malaysian GLCs. Notable studies by Mohamad et al. (2012) analyzed board and AC characteristics using data from 2003 and 2006, while Jamil and Nelson (2011) evaluated the relationship between AC and EM using data from 2003 to 2009. Bin and Yi (2015) delved into the relationship between board mechanisms and performance among 16 GLCs. In a more recent study, Alias et al. (2019) investigated the competency levels of internal auditors in detecting unethical practices among GLCs. Despite these existing studies, the interaction effect of audit governance mechanisms in Malaysia has been inadequately investigated so far, especially with a specific focus on GLCs. This paper ventures beyond the previous research, by investigating the effects of interactions between the AC, IAF and EA on EM among a sample of 340 Malaysian GLCs during the period from 2009 to 2018.

This study makes contributions in several ways. It adds to the existing literature by offering evidence on the interaction impact of external and internal governance functionality or mechanisms on EM. Furthermore, it examines corporate governance mechanisms and EM in the unique setting of Malaysian GLCs, which is less emphasized in prior studies. In addition, this study adds to the existing literature by using the resource dependence theory to discuss the interaction impacts among corporate governance mechanisms. Also, it offers empirical evidence to aid policymakers and regulatory bodies in making judgments regarding the interaction between governance mechanisms, by establishing and continuously enhancing the current regulations, guidelines and corporate governance codes.

The remainder of this study is organized as follows. The background of the GLCs in Malaysia is discussed in Section 2. Section 3 presents the literature review and the defined hypotheses. Section 4 outlines the research design, variable measurements and the research model. Section 5 discusses the empirical results. Finally, Section 6 concludes the study.

Background of the Study

Malaysian Code of Corporate Governance

In March 2000, the Malaysian Code of Corporate Governance (or MCCG) was first issued, representing a prominent milestone in terms of Malaysian corporate governance reform. The first MCCG covered various areas: the board of directors, directors' remunerations, shareholders, accountability, and audits (Ponnu and Karthigeyan, 2010). The code was then revised in 2007 to focus on independent directors and the AC, in order to ensure the reliable practice of corporate governance. Further revisions in 2012 aimed to strengthen the structure of the boards, and made recommendations regarding processes that firms should adopt, to help them embed correct corporate governance practices in their work culture. A new version of the code was released in April 2017 to supersede the earlier editions. A key focus of the code is the importance of building a solid working relationship and interaction between the AC, IAF and EA in the corporate governance process.

- (1) Under Practice 8.0: The AC should ask key questions to ensure whether the financial statements are generally consistent with the operational and other information when significant matters require judgment. In addition, the AC needs to offer advice on whether the financial statements show a fair and true perspective of the company's financial position and performance.
- (2) Under Practice 8.1: The responsibilities of the AC include communicating its views and concerns on related transactions to internal bodies as well as the EA. The AC should ensure there is coordination between internal auditors and the EA.

Malaysian GLCs

In its industrialization agenda after independence, the government has taken on a proactive role by launching state enterprises, later known as government-linked companies (or GLCs) (Ting and Lean 2011). The aim of establishing these GLCs is to resolve issues related to social development, while also achieving the economic goals laid out by the New Economic Policy (Hamid, 2011). PCG (2015) defines GLCs as companies that have a main commercial goal, whereby the government has a direct controlling stake. The government has the authority to assign management positions, contract rewards, strategies, financing, acquisitions, as well as divestment (Menon, 2017). The Malaysian government launched the 10-year GLC Transformation Program (GLCT) in response to efforts to improve GLC performance, with the goal of hastening Malaysia's social and economic development into that of a developed nation (PCG, 2015).

Although the 10-year GLCs Transformation Program (2004-2014) showed some positive changes in the GLCs' performance, it is still below the expected outcomes (The Star, 2022). According to the research division of Maybank Investment Bank, GLCs gen-

erally underperformed when compared to non-GLCs, which lowered the performance of the overall equity market (Aman, 2023). According to Isa and Lee (2016), some Malaysian GLCs have received criticism for their relatively subpar performance, as a result of operational and financial mismanagement problems that are reflected in a lower return on assets (ROA) and return on equity (ROE) figures. According to a recent Asia Sentinel report, some GLCs are suffering enormous losses, like the Kidzania investment, which has lost a total of RM 286.3 million (Hunter, 2023). The underperformance of the GLCs means that they must transform themselves to sustain their market competitiveness (PCG, 2015). Therefore, whether GLCs are performing better, or whether their improved performance is affected by earnings management, is still an open question that requires further research (Mohamad et al., 2012).

There have been few empirical investigations into the association between EM and corporate governance's functionality or mechanisms in GLCs in Malaysia. In an empirical work by Mohamad et al. (2012), the impacts of the board and the AC's characteristics toward EM were investigated by checking both GLCs pre- and post-transformation. The results indicated that no corporate governance mechanisms significantly affected the reduction of EM, except for the leadership structure and board meetings in post-transformation. Jamil and Nelson (2011) explored the link between the AC's characteristics as well as the financial reporting quality between the GLCs. With the exception of the AC's independence, the authors found that the AC's characteristics are not significantly linked to EM.

To date, there has been little discussion regarding the interaction effects of external and internal corporate governance mechanisms on EM in Malaysian GLCs. Hence, the complementary effects of the AC, IAF and EA are examined in this study, to determine whether corporate governance practices improve the GLCs' reporting quality.

Literature Review

EM and corporate governance

True and fair assessments of financial information are important for potential investors, who use the information to make rational and intelligent decisions about which firms they allocate resources to. However, EM occurs when managers utilize their judgment in financial reporting and in structuring transactions to change the financial reports to mislead certain stakeholders about the company's economic performance, or to impact contractual results that relate to documented accounting figures (Healy and Wahlen, 1999). Unlike fraud, EM involves selecting accounting strategies and figures that are in line with generally accepted accounting principles (or GAAP). Because accounting is subjective, using

judgment in a neutral approach without any intention of individual gain is not considered EM (Healy and Wahlen, 1999). Any companies that utilize EM operate within the legal limits of accounting manipulation (Rahman and Ali, 2006).

Within the theoretical model of the resource dependence theory, enterprises benefit from internal and external monitoring techniques with different degrees of knowledge and expertise. A solid corporate governance structure will enable effective monitoring of managerial decision-making and contribute to limiting EM actions (Al-Thuneibat, Al-Angari, and Al-Saad 2016). Agency theory emphasizes the critical role of corporate governance structures in supervising managerial behavior (Jensen and Meckling 1976). EM may indicate an agency problem, as management may manipulate the firm's profitability to obtain larger bonuses if the control processes are weak (Fama and Jensen 1983). The AC, IAF, and EA auditing functions act as monitoring mechanisms, limiting the risk in the financial reporting process and trying to improve the information flow among both managers and other stakeholders (Jensen and Meckling 1976). The auditing processes provide resources to improve the firm's internal controls and the integrity of its financial reporting (Pfeffer and Salancik 1978; Hillman and Dalziel 2003).

Interaction between AC and IAF

The AC has an essential role in evaluating the performance of the IAF, by ensuring the structure of the function has the ability to fulfill its responsibilities. Bursa Malaysia (2018) highlighted that the IAF is the “eyes and ears” of the AC, as it serves as a sounding board on deficiencies in the internal controls, and provides remedial advice to the AC. The IAF is the key line of defense of day-to-day management, and therefore is responsible for advising the AC on where it can minimize avoidable losses (Bursa Malaysia 2018).

It is crucial that the person responsible for the internal audit directly reports to the AC (Securities Commission Malaysia 2017). Based on MCCG 2017 Practice 10.1, the AC must ensure the assignment and removal, work scope, performance evaluation, as well as the defined budget for the IAF. Also, the IAF acts as a crucial source of advice for the AC in terms of weaknesses within internal procedures, to ensure the firm has suitable remedial strategies.

Prior works have suggested that the internal auditor must be linked with the AC in order to be successful. A study by Alzoubi (2019) showed that increased meetings between the AC and the IAF reduce the level of EM. In Palestine, the communication between the AC and the internal audit has significant effects on corporate governance (Sartawe and Shrouf 2017). The AC must check the internal audit activities and ensure its scope is adequate for good internal control (Scarborough, Rama, and Raghunandan 1998). Furthermore, García, Barbadillo, and Pérez (2010) found a significant negative interaction

between the AC and the internal audit on EM in Spanish companies. García, Barbadillo, and Pérez (2010) explained that the relationship between the AC and the internal auditor is necessary for effective internal control, thus increasing financial reporting quality. The AC must supervise the financial reporting process by overseeing the IAF, to ensure a sound internal control environment.

Agency theory suggests that coordination between the AC and IAF helps to monitor people's roles in the firm, thereby decreasing the likelihood of EM. Moreover, resource dependence theory explains that the IAF can offer valuable resource-dependence contributions to the AC, to enhance the financial reporting process (Udayasankar 2008; Hillman, Withers, and Collins 2009).

It is expected that the IAF can moderate the relationship between the AC and EM. Therefore, the first hypothesis was proposed as follows:

H1: The interaction of the AC and IAF is negatively associated with EM.

Interaction between AC and EA

The AC and EA both play a role in ensuring the production of high-quality financial reports that aid decision-making, maintain the company's reputation, and avoid legal liabilities (Alves 2013). Regulators expect the AC to act as the "bosses" of the EA (Compernelle 2018). Under MCCG 2017 Practice 8.3, the AC must review the audit plan, the evaluation of internal-based controls, and the audit report with the EA. The AC is required to perform a yearly evaluation on the EA' overall performance and undertake follow-up procedures. Furthermore, the AC must develop a list of audit quality indicators to monitor the effectiveness of the external audit process (Securities Commission Malaysia 2017).

According to Bursa Malaysia (2018), audit quality is not within the sole purview of external oversight bodies, but also the responsibility of the AC, as they must select and evaluate the EA. For instance, the Bursa Malaysia Listing Requirements stated that the AC must proactively oversee the external audit process (Bursa Malaysia 2018). Furthermore, the AC is encouraged to consult the EA on significant adjustments from the external audit if the need arises. A private meeting between the AC and EA must be established to discuss key audit challenges. The task of the AC includes meeting with the EA to discuss audit-related matters as well as proposing and handling the coordination of the audit work with the audit staff (Bursa Malaysia 2018).

The interaction between the AC and EA improves financial reports that are published and seen by the stakeholders (Mitchell, Singh, and Singh 2008). In Tunisia, the combined effect of the AC and the external audit shows a significant result on discretionary accruals, as this combination limits opportunistic management behaviors, such as EM (Zgarni,

Hlioui, and Zehri 2016). The AC has the task of overseeing the external audit procedure in order to enhance audit quality. A higher audit quality helps to restrict management's discretion over accounting issues, and thus results in higher financial reporting quality. In a study of Portuguese companies, Alves (2013) provides evidence regarding the interaction between the EA and AC, which suggests the two parties complement each other's roles in curbing EM. The AC has incentives to ensure high audit quality to reduce the litigation risk and loss of reputation (Goodwin-Stewart and Kent 2006a). Sulaiman (2017) explained that an effective AC can monitor the EA by securing appropriate resources for the audit.

Based on agency theory, the AC and EA are the most essential monitoring mechanisms. Thus, the interaction between these parties can reduce the conflict of interests and mitigate EM (Jensen and Meckling 1976). Resource dependence theory suggests that the AC possesses a distinct incentive and ability to demand a higher external audit quality, to achieve higher quality financial reporting (Mustafa, Che-Ahmad, and Chandren 2018). Hillman and Dalziel (2003) stated that the external audit's quality will be improved when the AC becomes more resourceful and plays a solid resource-dependence role. These two theories confirm that the interaction between the AC and EA can increase the quality of financial reporting. The EA is expected to moderate the relationship between the AC and EM. Thus, the second hypothesis was proposed:

H2: The interaction of the AC and EA is negatively associated with EM.

Interaction between EA and IAF

The EA are responsible for understanding the IAF and the related internal audit activities to conduct effective audits of the financial statements. According to ISA 610, the EA may use the work of the IAF to acquire audit evidence, and also offer assistance under its supervision (Malaysian Institute of Accountants 2018a). ISA 315 explains that effective communication between internal and external auditors may create an environment wherein the EA can be informed of critical events that can potentially impact the audit procedure. Moreover, the experience of the IAF can help the EA better understand the entity and its surrounding environment, and assess the associated risks of material misstatements (IAASB 2019).

Bursa Malaysia (2018) noted that the lack of coordination between the internal auditors and the EA can lead to gaps in the audit's coverage. Thus, the EA should coordinate with the internal auditors to avoid the duplication of efforts to optimize audit efficiency. The synergy between the IAF and EA has been discussed in previous research, which concluded that the two parties complement each other (Goodwin-Stewart and Kent 2006b). Singh and Newby (2010) mentioned that firms that utilize internal and external audits

are more likely to improve their operating environment. The researchers also mentioned that firms should focus on external and internal auditing, to improve the integrity of their financial reporting.

Munro and Stewart (2011) claimed that the EA are more likely to utilize internal audits for control evaluation processes than an extensive test of balance. Nevertheless, ISA 610 requires the EA to evaluate the objectivity and competence of the IAF before using their work. Therefore, the degree to which EA depend on internal audits is contingent upon the IAF's quality (Zain, Zaman, and Mohamed 2015). A high-quality IAF remains vital in a strong corporate governance culture, in order to assist the EA in improving the quality of financial reporting.

Based on agency theory, the interaction between the EA and the IAF ties the contractual relationships among principals and agents and results in lower EM (Jensen and Meckling 1976; Adams 1994). Furthermore, resource dependence theory suggests that internal auditors contribute their knowledge and understanding of a firm's internal control environment to assist the EA in conducting an effective audit, and thus increase the financial reporting's quality (Udayasankar 2008; Pfeffer and Salancik 1978). The resources provided by the IAF – including overall risk, control, and the governance environment of firms – are sensitive to the EA when making audit-planning decisions (Munro and Stewart 2011). It is expected that the IAF can moderate the relationship between the EA and EM. Thus, the third hypothesis was proposed:

H3: The interaction of the EA and IAF is negatively correlated with EM.

Research Design

Sample selection

To date, there are 47 GLCs listed on the Bursa Malaysia. However, the final sample utilized in this work consisted of 38 GLCs after excluding finance-related companies, which have different characteristics and operate in specific legal environments (Mohamad, Rashid, and Shawtari 2012). This study covered 10 years from 2009 to 2018 for several reasons. First, the MCCG was revised in 2012 and 2017 during those 10 years. Second, 2009 was an appropriate year to start data collection as it was the year that listed companies were first required to disclose the cost of their IAF, following the mandate by Bursa Malaysia (Al-Rassas and Kamardin 2016).

EM measurement

The Jones model has been extensively adopted in the literature on EM and is arguably the optimal framework for testing EM (Bernard and Skinner 1996). This study used a cross-sectional variation of a modified variant of the Jones model by Dechow, Sloan, and Sweeney (1995) to measure the discretionary accruals. After comparing it to five widely adopted models for discretionary accruals, the modified Jones model was deemed the optimal model for this type of investigation (Dechow, Sloan, and Sweeney 1995).

Based on prior work, this study used a variant of the cross-sectional method. According to Jaggi, Leung, and Gul (2009), and Klein (2002), a minimum of 10 different observations in every industry on a yearly basis are required to measure the coefficients for the discretionary accruals. This study comprised a sample of 38 GLCs, resulting in a relatively small number of companies in each industry. Due to the limited number of samples in each industry, conducting an analysis on an industry-specific basis might not produce statistically significant findings or meaningful insights (Ecker et al., 2013). To address this limitation, industry dummies were included in the regression to control for industry effects, following the prior studies by Kusnadi et al. (2015) and Bradbury et al. (2006). This approach ensured that no sample was eliminated from the analysis due to insufficient data within specific industries.

The framework segregated total accruals (or TACC) into non-discretionary accruals (or NDACC) and discretionary accruals (or DACC). Firstly, the total accruals were computed using the difference from the net income (before any extraordinary items) as well as the operating cash flow. The coefficient's parameters ($\alpha_1, \alpha_2, \alpha_3$) were measured using ordinary least squares regression for the years considered, as shown in Equation (1):

$$\frac{TACC_{it}}{A_{it-1}} = \alpha_1 \left(\frac{1}{A_{it-1}} \right) + \alpha_2 \left(\frac{\Delta REV_{it} - \Delta REC_{it}}{A_{it-1}} \right) + \alpha_3 \left(\frac{PPE_{it}}{A_{it-1}} \right) + IND_{jt} + \varepsilon_{it} \quad (1)$$

Where TACC_{it} represented the accruals for firm *i* during year *t*; A_{it-1} represented the assets for *i* for the end of the previous year; ΔREV_{it} represented the change in revenue for *i* for year *t* – 1 as well as *t*; ΔREC_{it} represented the change in the receivables for *i* for year *t* – 1 as well as *t*; PPE_{it} represented the gross property, plant as well as equipment for *i* during year *t*; IND_{jt} represented the industry dummy for industry *j* during year *t*.

Second, using the coefficient parameters estimated in Equation (1), NDACC was computed for every sample firm-year with the modified Jones variant model, as shown in Equation (2):

$$NDACC_{it} = \alpha_1 \left(\frac{1}{A_{it-1}} \right) + \alpha_2 \left(\frac{\Delta REV_{it} - \Delta REC_{it}}{A_{it-1}} \right) + \alpha_3 \left(\frac{PPE_{it}}{A_{it-1}} \right) + IND_{jt} \quad (2)$$

Finally, DACC was computed using the difference between TACC as well as NDACC. The high level of DACC reflected a high EM within the company. DACC was computed as shown in Equation (3):

$$DACC_{it} = TACC_{it} - NDACC_{it} \quad (3)$$

EM can be income-decreasing or increasing, and thus the absolute value of DACC was employed in this study. This was in line with previous research, which showed that absolute discretionary accruals are a suitable proxy (Oktavia et al., 2019). In essence, a high value represents a high EM.

Independent and control variables measurement

AC effectiveness measurement

Audit committee effectiveness (or ACE) was a composite variable consisting of four variables, with audit committee size (or ACSIZE), audit committee financial expertise (or ACFIN), audit committee independence (or ACIND), as well as audit committee meeting (or ACMEET). ACSIZE was estimated based on the number of AC members (García, Barbadillo, and Pérez 2010). ACFIN was estimated based on the financial experts available in the AC, compared to the number of members in the AC (Nehme and Jizi 2018). ACIND was estimated as the independent committee members, compared to the AC members (Rahman and Ali 2006). ACMEET estimated the total number of AC meetings that occurred throughout the year (Kusnadi et al. 2015).

According to Song et al. (2013), simple averaging is typically applied for defining a composite variable. First, the four variables (ACSIZE, ACFIN, ACIND, and ACMEET) were transferred to standardized z-scores. Such standardization was crucial, as the four variables had different variances, so any original variable did not unduly impact the composite variable with a relatively large variance (Song et al. 2013). Second, ACE was created by adding the standardized z-scores of all the variables.

IAF quality measurement

Internal audit function quality (or IAFQ) was a composite variable of two variables, including the size of the IAF (or IAFSIZE) and the sourcing arrangement of the IAF (or IAFSOUR). IAFSIZE was computed as a natural logarithm of the internal audit cost for each year (Yasin and Nelson 2012). IAFSOUR was measured using a dummy variable, which took 1 if the firm performs a full in-house IAF, and 0 if not (Al-Rassas and Kamarudin 2015). First, these variables were transformed into standardized z-scores. Second, the IAF quality (IAFQ) was defined by adding the standardized z-scores of the two variables considered (i.e. IAFSIZE and IAFSOUR).

External audit quality measurement

The external audit quality (or EAQ) was a composite variable of the four variables, comprising the size of the audit firm (or BIG4), audit fees (or AFEES), non-audit services fees (NAS), as well as audit partner tenure (or APTEN). BIG4 was determined using a dummy variable that took 1 value if Big 4 auditors audit the firm, or 0 otherwise (Park and Choi, 2023). AFEES was calculated as a natural logarithm of the annual external audit fees (Martinez and Moraes 2017). NAS was calculated as a ratio between non-audit services fees to fees paid to the auditors (Frankel, Johnson, and Nelson 2002). APTEN was calculated as the consecutive years in which the audit report had been signed by the original audit partner (Azizkhani, Monroe, and Shailer, 2013).

Firstly, the four variables, BIG4, AFEES, NAS, and APTEN, were transferred to standardized z-scores. Secondly, the standardized z-scores of NAS and APTEN were multiplied by (-1). A higher value of NAS and APTEN indicated lower auditor independence and lower external audit quality. Thirdly, the EAQ was defined by adding the standardized z-scores of the variables considered.

In addition, this study included five control variables to monitor the impact of firm characteristics, comprising leverage (LEV – total liabilities over total assets), return on assets (ROA – the yearly net profit of individual firm prior to tax over total assets), negative operating cash flow (NEGCF – a dummy variable that was 1 if the company had a negative operating cash flow, or 0 otherwise.), sales growth (SGR – annual sales growth (current year sales – prior year sales divided by prior year sales) and firm loss (LOSS – a dummy variable that was 1 if the company had a negative net income, or 0 otherwise) (Na et al., 2023; Park and Choi, 2023).

Research model

The following model was developed to investigate the interaction effects of the AC, IAF and EA and their effects on EM.

$$DACC_{it} = \beta_0 + \beta_1 ACE_{it} + \beta_2 IAFQ_{it} + \beta_3 EAQ_{it} + \beta_4 ACE * IAFQ_{it} + \beta_5 ACE * EAQ_{it} + \beta_6 EAQ * IAFQ_{it} + \beta_7 LEV_{it} + \beta_8 ROA_{it} + \beta_9 NEGCF_{it} + \beta_{10} SGR_{it} + \beta_{11} LOSS_{it} + \varepsilon_{it}$$

Where β_0 was the constant; β_1 to β_{13} was the coefficient; i was firm; t was year; and ε was the error term.

Results and Discussion

Descriptive statistics

Table 1 provides the statistics for all the variables considered. This study's average audit committee size (ACSIZE) was 3.597, whereas the maximum and minimum values were recorded at three and five, respectively. On average, 43.2% of directors on the ACs possessed accounting and financial expertise, and 80% of ACs' members were independent directors. This study's frequency of audit committee meetings (ACMEET) showed a mean value of 6.17 and a median value of six, which was higher than Bursa Malaysia's recommendation to hold at least four meetings yearly.

On average, the natural logarithm of the IAF's costs was recorded at 13.407 (RM3,663,813). In this study, 234 firm-year observations (68.8%) established a full in-house IAF, while 106 observations (31.2%) did not have a full in-house IAF. Three hundred and twenty-one firm-year observations (94.4%) were audited by Big 4 firms, while only 19 (5.6%) were audited by non-Big 4 firms. On average, the natural logarithm of the audit fees was 13.64 (RM2,156,792) among the sample firms, ranging from RM35,000 to RM28,000,000. The descriptive statistics showed that most of the sample firms followed the recommendation of Bursa Malaysia, which maintains that the non-audit fee ratio should be below 50%. The average audit partner tenure (APTEN) was 2.376 years, with a maximum and minimum of one year and five years. Before December 15, 2018, the Malaysian Institute of Accountants (2018b) stated that external audit partners were allowed to serve in the same role for a maximum of five years.

The firm-year average leverage (LEV) indicated that 46.6% of the sample's total assets were debt financing. The return on assets (ROA) for the sample firms ranged from -29.6% to 18.1%, with an average of 4.7%. Furthermore, 45 observations (13.2%) had a negative operating cash flow (NEGCF) in their financial year, while 295 observations (86.8%) had a positive operating cash flow in their financial year. The average sales growth (SGR) was 7.4%, ranging from -70.8% to 215.7%. The data also demonstrated that some samples had a negative figure for sales growth; this meant the current year's sales revenue was lower than the prior year. Forty-one observations (12.1%) recorded net losses in their financial year, while 299 observations (87.9%) recorded a net income in their financial year.

Table 1. Descriptive statistics (N=340)

Variables	Mean	Median	Standard Deviation	Minimum	Maximum	Skewness	Kurtosis
DACC	0.037	0.023	0.040	0.000	0.197	2.052	8.247

Variables	Mean	Median	Standard Deviation	Minimum	Maximum	Skewness	Kurtosis
AC							
ACSIZE	3.597	4.000	0.642	3.000	5.000	0.605	2.388
ACFIN	0.432	0.333	0.172	0.2	1.000	0.902	3.186
ACIND	0.803	0.750	0.154	0.333	1.000	-0.118	2.878
AC-MEET	6.170	6.000	2.397	2.000	15.000	1.531	6.134
ACE	0.000	-0.214	2.078	-5.462	5.776	0.484	4.853
LAF							
IAFSIZE	13.407	13.864	3.158	0.000	17.497	-2.822	12.734
IAF-SOUR	0.688	1.000	0.464	0.000	1.000	-0.813	1.661
IAFQ	0.000	0.786	1.778	-5.728	1.966	-1.426	4.741
EA							
BIG4	0.944	1.000	0.230	0.000	1.000	-3.867	15.954
AFEES	13.643	13.447	1.321	11.471	16.981	0.393	2.503
NAS	0.262	0.234	0.207	0.000	0.921	0.829	3.320
APTEN	2.376	2.000	1.267	1.000	5.000	0.549	2.205
EAQ	0.000	0.143	1.872	-5.607	3.359	-0.886	5.032
Control Variables							
LEV	0.466	0.484	0.158	0.132	0.869	-0.151	2.663
ROA	0.047	0.050	0.072	-0.296	0.181	-2.001	10.255
SGR	0.074	0.047	0.346	-0.708	2.157	2.781	18.434
NEGCF	0.132	0.000	0.339	0.000	1.000	2.170	5.708
LOSS	0.121	0.000	0.326	0.000	1.000	2.330	6.430

Based on the correlation matrix (see Table 2), there was no correlation coefficient higher than ± 0.8 among variables. Therefore, multicollinearity did not exist and would not lead to bias in the regression analysis (Gujarati and Porter 2009). A significant negative correlation was found between EM (DACC) and IAF (IAFQ) at a significance level of 1%. Moreover, DACC was significantly correlated with some control variables, including leverage (LEV), return on assets (ROA), negative operating cash flow (NEGCF), and firm loss (LOSS).

Table 2. Pearson Correlation Matrix

	DACC	ACE	IAFQ	EAQ	LEV	ROA	NEG-CF	SGR	LOSS
DACC	1.000								
ACE	-0.051	1.000							
IAFQ	-0.132***	0.467***	1.000						
EAQ	-0.054	0.078	0.373***	1.000					
LEV	0.138***	0.116**	0.150***	0.069	1.000				
ROA	-0.311***	-0.063	0.123**	0.099*	-0.484***	1.000			
NEGCF	0.291***	0.023	-0.132***	-0.210***	0.079	-0.222***	1.000		
SGR	-0.059	0.049	-0.063	-0.107**	-0.114**	0.152***	0.033	1.000	
LOSS	0.279***	0.053	-0.116**	-0.179***	0.262***	-0.697***	0.229***	-0.251***	1.000

Notes: Significant at the ***0.01 level, the **0.05 level, and the *0.10 level.

Regression analysis

Consistent with the prior studies, this study applied pre-estimations to test the appropriateness of the econometric model used. Based on Table 1, the skewness and kurtosis of the variables were applied to examine the normality of the data. As a rule of thumb, Rahman and Ali (2006) have stated that data are considered normal if the skewness is in the range of ± 1.96 , and kurtosis is in the range of ± 2.00 . In this study, the variables of ROA and SGR recorded a high kurtosis value of 10.255 and 18.434, respectively. The dependent variable, DACC, recorded a relatively high kurtosis value of 8.247. Thus, these variables violated the assumptions of normality in this study. Moreover, the Shapiro-Wilk assessment was carried out to investigate the normality of the model's residuals. The result ($p = 0.00$) indicated that the normality assumption was not fulfilled. Notwithstanding, due to the larger size of the cross-section and time-series dimensions of the panel dataset, the normal distribution of data for the panel dataset was not required (Levin et al., 2002). In addition, the statistical approaches used to test homoscedasticity were Breusch and Pagan's (1979) and White's (1980) tests. The results of these two tests ($p = 0.00$) indicated that heteroscedasticity problems were present. Additionally, serial correlation was examined using Wooldridge's (2002) test, as this test could be applied in the context of panel data. The results showed non-significant p-values ($p = 0.80$, $p > 0.05$) in all the models, and thus the data did not suffer from a serial correlation issue. Due to the presence of heteroscedasticity, this study utilized a generalized least squares (GLS) regression to correct the problems of non-normality, heteroscedasticity, and autocorrelation in the time series data (Alzoubi 2018).

Hausman's (1978) test was used to distinguish the most appropriate model between fixed effects or random effects for the panel data. The Hausman test showed a p-value of 0.124, 0.157, 0.344 and 0.716 for models 1 to 4, respectively. The results indicated

that the null hypothesis of the Hausman test should be accepted, and therefore, the random effects GLS regression would be more appropriate.

Four models were presented to investigate the interaction effects of corporate governance on EM. Model 1 investigated the interaction of the AC and IAF, while model 2 investigated the interaction of the AC and EA. Model 3 investigated the interaction effects of the EA and IAF on EM. Model 4 included all the governance mechanisms and their interaction effect on EM. Table 3 displays the random effects GLS regression models for EM (DACC). All the models were significant with R2 values of 18.09%, 16.02%, 17.26%, and 19.55%, respectively.

Table 3. Random effect GLS regression results

Dependent Variable: DACC									
Model		(1)		(2)		(3)		(4)	
Variables	Expected Sign	Coefficient value	z value						
ACE	-	-0.0005	-0.38	-0.0014	-1.22			-0.0003	-0.28
IAFQ	-	-0.0033	-1.93**			-0.0034	-2.14**	-0.0046	-2.53***
EAQ	-			0.0009	0.72	0.0013	1.04	0.0013	1.00
ACE*IAFQ	-	-0.0012	-2.47***					-0.0012	-2.26**
ACE*EAQ	-			-0.0005	-0.86			0.0001	0.05
EAQ*IAFQ	-					-0.0012	-1.96**	-0.0012	-1.82*
LEV	+	0.0082	0.50	-0.0009	-0.05	-0.0025	-0.14	0.0019	0.11
ROA	-	-0.1132	-2.54***	-0.1263	-2.82***	-0.1248	-2.76***	-0.1185	-2.64***
NEG-CF	+	0.0222	3.58***	0.0246	3.88***	0.0235	3.73***	0.0226	3.58***
SGR	+	-0.0008	-0.14	0.0007	0.12	0.0007	0.12	0.0010	0.16
LOSS	+	0.0063	0.71	0.0077	0.85	0.0069	0.77	0.0071	0.80
Constant		0.0367	3.88***	0.0391	4.02***	0.0414	4.15***	0.0410	4.20***
R ²		18.09%		16.02%		17.26%		19.55%	
Wald Chi ²		60.45***		51.43***		55.66***		64.09***	
N		340		340		340		340	

Notes: Significant at the ***0.01 level, the **0.05 level, and the *0.10 level.

In relation to H1, the interaction of the AC and IAF was negatively correlated with EM. The interaction variable (ACE*IAFQ) was significantly and negatively related to EM at the 1% and 5% levels. The audit committee's effectiveness (ACE) recorded a negative and non-significant relationship with EM. After being moderated by the internal audit function's quality (IAFQ), ACE significantly and negatively impacted EM. Thus, the results support H1 in this study, which found that the synergy between an effective AC and

high IAF quality would significantly reduce the level of EM. This result is in line with the results by García, Barbadillo, and Pérez (2010) in the context of Spanish companies. This implies that an effective AC will reduce the EM when firms have a high-quality IAF. It also indicates that a high-quality IAF provides better assistance to the AC in monitoring the financial reporting procedure.

A high-quality IAF can be considered as a value-added service to the AC. The negative relationship matched with their usual duties. The AC is responsible for monitoring the internal audit and supporting the independence, competence, and budget for the internal audit. The IAF needs to build a competent function to align with the corporate governance needs, and communicate the findings of the analysis and audit to the AC (Rittenberg 2016). This suggests that the collaboration between these two parties could limit opportunistic management behavior and thus lead to higher financial reporting quality.

Hypothesis 2 stated that the interaction between the AC and EA is negatively associated with EM. Based on Table 3, the ACE and the external audit quality were not significantly correlated to EM. This study found no significant correlation between external audit quality (EAQ) and EM. Further, the results found a non-significant relationship between the interaction variable (ACE*EAQ) and EM; thus, this study failed to support H2. This unanticipated finding indicates that the combination of an effective AC and high external audit quality does not have any effect on EM. This contradicts normal expectations, which dictate that they should monitor the financial reporting procedure.

In contrast to the prior studies by Alves (2013) and Zgarni, Hlioui, and Zehri (2016), this study found no evidence between the interaction of ACE, EAQ and EM in the context of Malaysian GLCs. A possible explanation for this result is that the purported benefits of coordination between the AC and EA may be less than anticipated by policy-makers and regulators. During his study of French companies, Compennolle (2018) found that the EA believed they did not require the AC's supervision in order to be trusted professionals. The EA expressed that the AC's members cannot challenge them in terms of their professionalism. In addition, the EA expressed that the AC cannot request information from them, as they felt the AC was less independent compared to them (Compennolle 2018). Thus, in practice, the relationship between the AC and the EA may not meet the regulators' expectations.

With regard to H3, the interaction between the EA and IAF was negatively associated with EM. The interaction effect of the EA and IAF (EAQ*IAFQ) was found to be significantly associated with discretionary accruals at the 5% and 10% levels, respectively. The negative coefficients were observed and implied that the EAQ and IAFQ appearing jointly had a negative impact on EM. This shows that the simultaneous presence of high quality external and internal audits will significantly decrease the likelihood of EM.

It is expected that the IAF moderates the relationship between the EA and EM. The relationship between the EAQ and EM showed a positive coefficient and was not significant at any conventional level. After being moderated by IAFQ, the external audit quality significantly and negatively impacted EM. This implies that a high quality external audit leads to lower EM when firms have a high-quality IAF.

These results are in line with the prior work, which found that the EA and IAF are complementary to each other (Goodwin-Stewart and Kent 2006b; Singh and Newby 2010). This study confirms that the interaction between these two parties could decrease the likelihood of EM, and increase the quality of the financial reporting by Malaysian GLCs. The negative interaction effect could be attributed to the fact that a high-quality IAF induces a greater EA' dependence on the internal auditors' work. A high-quality IAF provides a better understanding of the company's internal control environment and financial reporting processes, to assist the EA in carrying out their audit. Thus, the EA can potentially reduce the testing level and better solve prominent accounting problems (Zain, Zaman, and Mohamed 2015).

Among the control variables, the return on assets (ROA), and negative operating cash flow (NEGCF) have a significant relationship with EM. The negative coefficients between ROA and discretionary accruals were observed. These results are in line with the results by Abdallah (2018), who suggested that firms with profitability difficulties and external financing needs have more incentive to become involved in EM. Furthermore, firms with a negative operating cash flow are more likely to become involved in EM, to send positive signals to investors. This result is in line with the prior studies, which show positive associations between negative operating cash flow and EM (Bédard, Chtourou, and Courteau 2004; Albersmann and Hohenfels 2017).

Conclusion

Three main conclusions can be derived from this study concerning the interaction impacts of external and internal audit corporate governance mechanisms on earnings management in Malaysian GLCs. First, an effective AC and a high-quality IAF occurring jointly can decrease the management's incentive to become more deeply engaged in EM. This indicates that a high-quality IAF moderates the relationship between the AC and EM. Second, the interaction of the IAF and EA leads to an improvement in earnings quality. This implies that a high-quality IAF moderates the relationship between the EA and EM. Third, contrary to expectations, there is an insignificant interaction effect between the AC and the EA on EM. This indicates that the relationship between the AC and the EA does not guarantee the anticipated advantages. Overall, the present study highlights evidence

of the complementary roles of the IAF in curbing EM. This research suggests that the IAF significantly moderates the relationship between the AC, EA, and EM. Similar to the observations made by Hassan, Hijazi, and Naser (2017), the complementary effects of corporate governance mechanisms are evident in this study. Based on the resource dependence theory, the results show that firm governance mechanisms can potentially result in the generation of specific resources to assist a firm in achieving its key strategic objective – financial reporting quality.

This research has practical implications for policymakers and companies concerned with corporate governance contributions to ensure financial reporting quality. This study highlights the positive complementary effects of corporate governance mechanisms. Thus, regulators and companies should focus on directing and strengthening the interfaces between/among the governance mechanisms to achieve its expected benefits. Next, this study specifically focuses on corporate governance in Malaysian GLCs. The findings contribute additional evidence to the government's regulatory bodies, such as the Putrajaya Committee, in assessing the contribution of corporate governance mechanisms to attaining high quality financial reporting among Malaysian GLCs. The results of this study could be helpful to the Putrajaya Committee in forming specific policies or programs for GLCs to maintain their business competitiveness.

This study comes with some limitations. First, the sample applied relates only to Malaysian GLCs. Therefore, the results of this study cannot be generalized to other firms listed on Bursa Malaysia. Second, the conclusion of this study may not be generalized to other nations with different regulated markets, as GLCs in Malaysia are defined differently compared to GLCs originating in other countries. Nevertheless, this study could offer useful findings to developing countries with similar market regulations. Finally, this study only examines the interaction effects of three key governance mechanisms; it may be the case that other mechanisms, such as the board of directors, play a role in reducing earnings management practices. Moreover, future research is necessary to gain a more substantive understanding of the nature and quality of the interactions between external and internal audit corporate governance mechanisms in GLCs. Additionally, this study utilizes only one proxy measure of accounting-based earnings quality; future research may use alternative measures of earnings quality.

References

- Abdallah, S. 2018. "External Auditor Type, Discretionary Accruals and Investors' Reactions." *Journal of Accounting in Emerging Economies* 8 (3): 352–368. doi:10.1108/JAEE-10-2017-0098.
- Adams, M. B. 1994. "Agency Theory and the Internal Audit." *Managerial Auditing Journal* 9(8): 8–12. doi:10.1108/02686909410071133.
- Al-Absy, M. S. M., K. N. I. K. Ismail, and S. Chandren. 2019. "Audit Committee Chairman Characteristics and Earnings Management." *Asia-Pacific Journal of Business Administration* 11(4): 339–370. doi:10.1108/APJBA-10-2018-0188.
- Al-Rassas, A. H., and H. Kamardin. 2015. "Internal and External Audit Attributes, Audit Committee Characteristics, Ownership Concentration and Earnings Quality: Evidence from Malaysia." *Mediterranean Journal of Social Sciences* 6(3): 458–470. doi:10.5901/mjss.2015.v6n3p458.
- Al-Rassas, A. H., and H. Kamardin. 2016. "Earnings Quality and Audit Attributes in High Concentrated Ownership Market." *Corporate Governance (Bingley)* 16(2): 377–399. doi:10.1108/CG-08-2015-0110.
- Al-Thuneibat, A. A., H. A. Al-Angari, and S. A. Al-Saad. 2016. "The Effect of Corporate Governance Mechanisms on Earnings Management Evidence from Saudi Arabia." *Review of International Business and Strategy* 26(1): 2–32. doi:10.1108/RIBS-10-2013-0100.
- Albersmann, B. T., and D. Hohenfels. 2017. "Audit Committees and Earnings Management – Evidence from the German Two-Tier Board System." *Schmalenbach Business Review* 18(2): 147–178. doi:10.1007/s41464-017-0028-9.
- Alias, N. F., Nawawi, A., & Salin, A. S. A. P. (2019). "Internal auditor's compliance to code of ethics: Empirical findings from Malaysian Government-linked companies." *Journal of Financial Crime*, 26(1), 179–194. <https://doi.org/10.1108/JFC-07-2017-0066>
- Alves, S. 2013. "The Impact of Audit Committee Existence and External Audit on Earnings Management Evidence from Portugal." *Journal of Financial Reporting and Accounting* 11(2): 143–165. doi:10.1108/JFRA-04-2012-0018.
- Alzoubi, E. S. S. 2018. "Audit Quality, Debt Financing, and Earnings Management : Evidence from Jordan." *Journal of International Accounting, Auditing and Taxation* 30: 69–84. doi:10.1016/j.intaccudtax.2017.12.001.
- Alzoubi, E. S. S. 2019. "Audit Committee, Internal Audit Function and Earnings Management : Evidence from Jordan." *Meditari Accountancy Research* 27(1): 72–90. doi:10.1108/MEDAR-06-2017-0160.**
- Aman A. S. (2023), Wanted: GLC Transformation 2.0. New Straits Time. Available at: <https://www.nst.com.my/business/2023/07/930796/wanted-glc-transformation-20>
-

- Azizkhani, M., G. S. Monroe, and G. Shailer. 2013. "Audit Partner Tenure and Cost of Equity Capital." *Auditing: A Journal of Practice & Theory* 32(1): 183–202. doi:10.2308/ajpt-50308.
- Bédard, J., S. M. Chtourou, and L. Courteau. 2004. "The Effect of Audit Committee Expertise, Independence, and Activity on Aggressive Earnings Management." *Auditing: A Journal of Practice & Theory* 23(2): 13–35. doi:10.2308/aud.2004.23.2.13.
- Bernard, V. L., and D. J. Skinner. 1996. "What Motivates Managers' Choice of Discretionary Accruals?" *Journal of Accounting and Economics* 22(1–3): 313–325. doi:10.1016/S0165-4101(96)00431-4.
- Bin, R. L., & Yi, L. S. (2015). "Board mechanisms and performance of government-linked companies on Bursa Malaysia." *Procedia Economics and Finance* 31(399–417). doi:10.1016/s2212-5671(15)01215-0
- Bradbury, M., Y. T. Mak, and S. M. Tan. 2006. "Board Characteristics, Audit Committee Characteristics and Abnormal Accruals." *Pacific Accounting Review* 18(2): 47–68. doi:10.1108/01140580610732813.
- Breusch, T. S., and A. R. Pagan. 1979. "A Simple Test for Heteroscedasticity and Random Coefficient Variation." *Econometrica* 47(5): 1287–1294.
- Bursa Malaysia. 2018. *Corporate Governance Guide: Moving from Aspiration to Actualization*. 3rd ed. Bursa Malaysia Berhad.
- Compernelle, T. 2018. "Communication of the External Auditor with the Audit Committee - Managing Impressions to Deal with Multiple Accountability Relationships." *Accounting, Auditing & Accountability Journal* 31(3): 900–924. doi:10.1108/AAAJ-05-2013-1356.
- Davidson, R., J. Goodwin-Stewart, and P. Kent. 2005. "Internal Governance Structures and Earnings Management." *Accounting and Finance* 45(2): 241–267. doi:10.1111/j.1467-629x.2004.00132.x.
- Dechow, P. M., R. G. Sloan, and A. P. Sweeney. 1995. "Detecting Earnings Management." *The Accounting Review* 70(2): 193–225. <https://www.jstor.org/stable/248303>.
- Ecker, F., Francis, J., Olsson, P., & Schipper, K. (2013). "Estimation sample selection for discretionary accruals models." *Journal of Accounting and Economics* 56(2–3): 190–211. doi:10.1016/j.jacceco.2013.07.001
- Eusoff, N. S. 2018. "Auditor-General's Report on 1MDB: Poor Corporate Governance at 1MDB." *The Edge*, May 31.
- Fama, E. F., and M. C. Jensen. 1983. "Agency Problems and Residual Claims." *The Journal of Law & Economics* 26(2): 327–349.
- Frankel, R. M., M. F. Johnson, and K. K. Nelson. 2002. "The Relation between Auditors' Fees for Nonaudit Services and Earnings Management." *The Accounting Review* 77: 71–105. doi:10.2308/accr.2002.77.s-1.71.

- García, L., E. Barbadillo, and M. Pérez. 2010. "Audit Committee and Internal Audit and the Quality of Earnings: Empirical Evidence from Spanish Companies." *Journal of Management & Governance* 16: 305–331. doi:10.1007/s10997-010-9152-3.
- Goncharov, I. 2005. *Earnings Management and Its Determinants: Closing Gaps in Empirical Accounting Research*. Frankfurt am Main: Peter Lang.
- Goodwin-Stewart, J., and P. Kent. 2006a. "Relation between External Audit Fees, Audit Committee Characteristics and Internal Audit." *Accounting and Finance* 46(3): 387–404. doi:10.1111/j.1467-629X.2006.00174.x.
- Goodwin-Stewart, J., and P. Kent. 2006b. "The Use of Internal Audit by Australian Companies." *Managerial Auditing Journal* 21(1): 81–101. doi:10.1108/02686900610634775.
- Gujarati, D. N., and D. C. Porter. 2009. *Basic Econometrics*. 5th ed. New York: McGraw-Hill.
- Haat, M. H. C., R. A. Rahman, and S. Mahenthiran. 2008. "Corporate Governance, Transparency and Performance of Malaysian Companies." *Managerial Auditing Journal* 23(8): 744–778. doi:10.1108/02686900810899518.
- Hassan, Y., R. Hijazi, and K. Naser. 2017. "Does audit committee substitute or complement other corporate governance mechanisms?" *Managerial Auditing Journal* 32 (7): 658–681.
- Hamid, A. A. 2011. "Network Governance in Government-Linked Companies (GLCs) and Non-Government-Linked Companies (NGLCs) in Malaysia." *Journal of Financial Reporting & Accounting* 9(1): 1985–2517. doi:10.1108/19852511111139804.
- Hausman, J. A. 1978. "Specification Tests in Econometrics." *Journal of the Econometric Society*, 1251–1271.
- Healy, P. M., and J. M. Wahlen. 1999. "A Review of the Earnings Management Literature and Its Implications for Standard Setting." *Accounting Horizons* 13(4): 365–383. doi:10.2308/acch.1999.13.4.365.
- Hillman, A. J., and T. Dalziel. 2003. "Boards of Directors and Firm Performance: Integrating Agency and Resource Dependence Perspectives." *Academy of Management Review* 28(3): 383–396. doi:10.5465/AMR.2003.10196729.
- Hillman, A. J., M. C. Withers, and B. J. Collins. 2009. "Resource Dependence Theory: A Review." *Journal of Management* 35(6): 1404–1427. doi:10.1177/0149206309343469.
- Hunter, M. (2023). Malaysia's Flailing GLCs: Designed to bootstrap the Malay community, they are enriching the elite and widening the income gap. Asia Sentinel. Available at: <https://www.asiasentinel.com/p/malaysia-flailing-government-linked-companies>
- IAASB. 2019. ISA 315 (Revised 2019) and Conforming and Consequential Amendments to Other International Standards Arising from ISA 315 (Revised 2019). *New York: International Auditing and Assurance Standards Board*.
-

- IFAC. 2019. International Standard on Auditing 200. *International Federation of Accountants*.
- Institute of Internal Auditors. 2017. Guidance for an Effective Internal Audit Function. *Kuala Lumpur: The Institute of Internal Auditors Malaysia*.
- Isa, M., & Lee, S. (2016). "The performance of government-linked companies in Malaysia." *Capital Markets Review*, 24(2), 1-13.
- Jaggi, B., S. Leung, and F. Gul. 2009. "Family Control, Board Independence and Earnings Management: Evidence Based on Hong Kong Firms." *Journal of Accounting and Public Policy* 28(4): 281–300. doi:10.1016/j.jaccpubpol.2009.06.002.
- Jamil, N. N., and S. P. Nelson. 2011. "An Investigation on the Audit Committees Effectiveness: The Case for GLCs in Malaysia." *Gadjah Mada International Journal of Business* 13(3): 287–305. doi:10.22146/gamaijb.5484.
- Jensen, M. C., and W. H. Meckling. 1976. "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure." *Journal of Financial Economics* 3(4). Harvard University Press: 305–360.
- Khalil, M., and A. Ozkan. 2016. "Board Independence, Audit Quality and Earnings Management: Evidence from Egypt." *Journal of Emerging Market Finance* 15(1): 84–118. doi:10.1177/0972652715623701.
- Khor, M. 2018. "Tackling GLCs - the Good, Bad and Ugly." *The Star*, June 18.
- Klein, A. 2002. "Audit Committee, Board of Director Characteristics, and Earnings Management." *Journal of Accounting and Economics* 33: 375–400.
- Kusnadi, Y., K. S. Leong, T. Suwardy, and J. Wang. 2015. "Audit Committees and Financial Reporting Quality in Singapore." *Journal of Business Ethics* 139: 197–214. doi:10.1007/s10551-015-2679-0.
- Levin, A., Lin, C. F., & Chu, C. S. J. (2002). "Unit root tests in panel data: asymptotic and finite-sample properties." *Journal of econometrics*, 108(1), 1-24.
- Malaysian Institute of Accountants. 2018a. ISA 610 (Revised 2013) Using the Work of Internal Auditors. Kuala Lumpur.
- Malaysian Institute of Accountants. 2018b. Questions and Answers on Audit Partner Rotation Requirements in Malaysia.
- Martinez, A. L., and A. D. J. Moraes. 2017. "Relationship between Auditors' Fees and Earning Management." *RAE Revista de Administracao de Empresas* 57: 148–157.
- Menon, J. 2017. Government-Linked Corporations: Impacts on the Malaysian Economy. *Kuala Lumpur: Policy IDEAS*.
- Menon, J. 2018. "What Should Be Done about Govt-Linked Companies?" *New Straits Times*, June 19.
- Menon, J., and T. H. Ng. 2013. "Are Government-Linked Corporations Crowding out Private Investment in Malaysia?" *ADB Economics Working Paper Series* 345.

- Mitchell, J. W., H. Singh, and I. Singh. 2008. "Association between Independent Audit Committee Members' Human-resource Features and Underpricing." *Journal of Human Resource Costing & Accounting* 12 (3): 179–212. doi:10.1108/14013380810919840.
- Mohamad, M. H. S., H. M. A. Rashid, and F. A. M. Shawtari. 2012. "Corporate Governance and Earnings Management in Malaysian Government Linked Companies: The Impact of GLCs' Transformation Policy." *Asian Review of Accounting* 20(3): 241–258. doi:10.1108/13217341211263283.
- Mohammad, W. M. W., and S. Wasiuzzaman. 2020. "Effect of Audit Committee Independence , Board Ethnicity and Family Ownership on Earnings Management in Malaysia." *Journal of Accounting in Emerging Economies* 10(1): 74–99. doi:10.1108/JAEE-01-2019-0001.
- Munro, L., and J. Stewart. 2011. "External Auditors ' Reliance on Internal Auditing: Further Evidence." *Managerial Auditing Journal* 26(6): 464–481. doi:10.1108/02686901111142530.
- Mustafa, A. S., A. Che-Ahmad, and S. Chandren. 2018. "Board Diversity, Audit Committee Characteristics and Audit Quality: The Moderating Role of Control-Ownership Wedge." *Business and Economic Horizons* 14(3): 587–614. doi:10.15208/beh.2018.42.
- Na, K., Lee, Y., and Yu, H. 2023. "CEO type and earnings management to avoid loss or earnings decreases: Evidence from South Korea". *Gadjah Mada International Journal of Business* 25(2): 227–254. doi:10.22146/gamaijb.72880
- Nehme, R., and M. Jizi. 2018. "The Efficiency of Corporate Boards and Firms' Audit Fees: The Case of the FTSE Financial Institutions." *Pacific Accounting Review* 30(3): 297–317. doi:10.1108/PAR-12-2016-0116.
- Oktavia, O., Siregar, S. V., Wardhani, R., and Rahayu, N. 2019. "The effects of financial derivatives on earnings management and market mispricing". *Gadjah Mada International Journal of Business* 21(3): 289–307. doi:10.22146/gamaijb.34112
- Park, H. J., and Choi, J. 2023. "Financial distress and audit report lags: An empirical study in Korea". *Gadjah Mada International Journal of Business* 25(3): 301–326. doi:10.22146/gamaijb.72251
- PCG (Putrajaya Committee on GLC High Performance). 2015. *GLC Transformation Programme Graduation Report*. Putrajaya.
- Pfeffer, J., and G. Salancik. 1978. *The External Control of Organizations: A Resource Dependence Perspective*. New York: Harper & Row.
- Ponnu, C. H., and R. M. Karthigeyan. 2010. "Board Independence and Corporate Performance: Evidence from Malaysia." *African Journal of Business Management* 4(6): 858–868.

- Prawitt, D. F., J. L. Smith, and D. A. Wood. 2009. "Internal Audit Quality and Earnings Management." *The Accounting Review* 84(4): 1255–1280. doi:10.2308/accr.2009.84.4.1255.
- Rahman, R. A., and F. H. Ali. 2006. "Board, Audit Committee, Culture and Earnings Management: Malaysian Evidence." *Managerial Auditing Journal* 21(7): 783–804. doi:10.1108/02686900610680549.
- Rittenberg, L. E. 2016. *Interacting with Audit Committees: The Way Forward for Internal Audit*. Florida: The IIA Research Foundation.
- Sartawe, A. S., and L. Shrouf. 2017. "The Impact of Interaction between Audit Committee and Internal Audit of Enhance the Corporate Governance at Listed Palestinian Companies." *International Journal of Applied Business and Economic Research* 15 (21): 287–304. doi:10.2139/ssrn.2902640.
- Scarbrough, D. P., D. V. Rama, and K. Raghunandan. 1998. "Audit Committee Composition and Interaction with Internal Auditing: Canadian Evidence." *Accounting Horizons* 12(1): 51–62.
- Securities Commission Malaysia. 2017. *Malaysian Code on Corporate Governance*. Kuala Lumpur.
- Selahudin, N. F., and D. Nawang. 2015. "The Impacts of Government Ownership on Earnings Management Practices in Malaysian Public Listed Companies." *Journal of Education and Social Sciences* 2: 94–101.
- Singh, H., and R. Newby. 2010. "Internal Audit and Audit Fees : Further Evidence." *Managerial Auditing Journal* 25(4): 309–327. doi:10.1108/02686901011034153.
- Song, M., F. Lin, S. E. Ward, and J. P. Fine. 2013. "Composite Variables: When and How." *Nursing Research* 62(1): 45–49. doi:10.1097/NNR.0b013e3182741948.
- Sulaiman, N. A. 2017. "Oversight of Audit Quality in the UK: Insights into Audit Committee Conduct." *Meditari Accountancy Research* 25(3): 351–367. doi:10.1108/ME-DAR-08-2016-0074.cr
- The Star (2022). *GLC/GLICs role in making Malaysia a developed nation* (Sunday, 13 March 2022). Available at: <https://www.thestar.com.my/news/nation/2022/03/13/glcglics-role-in-making-malaysia-a-developed-nation>
- Ting, I. W. K., and H. H. Lean. 2011. "Capital Structure of Government Linked Companies in Malaysia." *Asian Academy of Management Journal of Accounting and Finance* 7(2): 137–156.
- Udayasankar, K. 2008. "The Foundations of Governance Theory: A Case for the Resource-Dependence Perspective." *Corporate Ownership and Control* 5(4): 164–172. doi:10.22495/cocv5i4c1p1.
- White, H. 1980. "A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity." *Econometrica* 48(4): 817–838.

- Wooldridge, J. M. 2002. *Econometric Analysis of Cross Section and Panel Data*. London, England: The MIT Press.
- Yasin, F. M., and S. P. Nelson. 2012. "Audit Committee and Internal Audit: Implications on Audit Quality." *IIUM Journal of Economics and Management* 20(2): 187–218.
- Zain, M. M., M. Zaman, and Z. Mohamed. 2015. "The Effect of Internal Audit Function Quality and Internal Audit Contribution to External Audit on Audit Fees." *International Journal of Auditing* 19: 134–147. doi:10.1111/ijau.12043.
- Zgarni, I., K. Hlioui, and F. Zehri. 2016. "Effective Audit Committee, Audit Quality and Earnings Management Evidence from Tunisia." *Journal of Accounting in Emerging Economies* 6(2): 138–155. doi:10.1108/JAEE-09-2013-0048.

Factors Causing Panic Purchasing Behavior during the COVID-19 Pandemic and Customer Satisfaction with Government Intervention as the Moderating Variable

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Abstract: It is essential to observe the phenomenon of panic buying during the COVID-19 pandemic. Additionally, research into panic buying spans multiple study fields, and deserves more consistent scientific attention. This study examines the factors of panic buying behavior using the theory of Maslow's hierarchy of needs to scrutinize panic buying behavior regarding consumer needs. Subsequently, this study investigates the moderating variable of government intervention to fill the research gap. Furthermore, this study looks for the effect on customer satisfaction that resulted from the panic buying behavior phenomenon. The data were collected from 456 grocery and drug store consumers in Indonesia, who shopped throughout the COVID-19 pandemic. PLS-SEM was used to analyze the data. The outcomes indicate that control, social media, perceived severity, and perceived scarcity significantly affect panic buying behavior. In contrast, government intervention only moderated the effect of social media on panic buying. Finally, the phenomenon of panic buying significantly affects customer satisfaction.

Keywords: panic buying behavior, perceived severity, perceived scarcity, government intervention, customer satisfaction.

JEL Classification: C12, M31, M3

Introduction

Panic buying refers to a behavioral phenomenon where people buy a product in massive quantities, in anticipation of supply problems due to a severe crisis or disaster (Tsao, Raj, and Yu, 2019). Ardyan et al. (2021) stated that the death rate due to the COVID-19 pandemic was very high in various countries. It affected over 220 million people, accounting for approximately 2.91% of the world's population (Ming and Jais, 2022). The increased mortality rate due to the COVID-19 pandemic coerced people to stay at home, as evidenced by the global "Stay at home" movement. Consequently, panic buying became a common phenomenon during this pandemic. Panic buying began when people felt frightened (Taylor, 2021) that there was large-scale buying worldwide. Sirletti et al. (2020) also mentioned that when people became nervous, this led to a lot of grocery shopping, especially for household needs, such as toilet paper, masks, hand sanitizer, food, and water.

That behavioral phenomenon also occurred in some metropolitan areas in Indonesia. Izzaty (2020), in Ardyan et al. (2021), explained that panic buying started when two COVID-19 patients were identified in March 2020, as announced by the Indonesian government. The occurrence of panic buying had a significant impact on the rise in Indonesian retail prices and other industries. Despite the significance of research into panic buying behavior, there still needs to be more academic studies in this field (Chua et al., 2021). According to Billore and Anisimova (2021), research into panic buying spans multiple fields of study. There needs to be a consistent effort to study this phenomenon, for the good of marketing and consumer studies. Billore and Anisimova (2021) argue that the structure of panic buying still needs to be put into practice, and needs more coherent academic attention to build new and more profound knowledge related to consumer behavior theories and frameworks.

The literature review conducted by Yuen et al. (2021) notes that the published research focuses primarily on the social and psychological stimuli of panic buying behavior, rather than the motivational needs of individuals while facing problems or threats. Therefore, this study aims to further the theoretical research into the panic buying of consumers. This study analyzes the relationship between panic buying and Maslow's hierarchy of needs theory.

The remaining sections of the study are structured as follows. Based on the relevant literature on Maslow's hierarchy of needs theory, a theoretical model is proposed to account for individuals' panic buying. The data collection, organization, illustration, and interpretation process are then discussed. Subsequently, the article will expound on the significant findings, highlighting their alignment with the Maslow's hierarchy of needs theory.

Moreover, practical consequences, for both theory and policy, are discussed, and the paper ends with suggestions for further study.

Literature Review

The Theory of Maslow's Hierarchy of Needs

This study uses the theory of Maslow's hierarchy of needs to explain the factors influencing consumer panic buying behavior. According to Maslow (1943), as seen in Figure 1, there are five levels of people's needs: physiological, security, social, esteem, and self-actualization. This study then classifies the perceived scarcity variable into physiological needs, the perceived severity variables into safety needs, the social media posts variables into social conditions, and the control variables into esteem needs. This research focuses on the four lowest levels of Maslow's hierarchy of needs theory (physiological, safety, social, and esteem) as these form the parts of the most essential and vital human needs (Yuen et al., 2021). During the pandemic, the mentioned needs were dispossessed and threatened. As such, in a dispossessed situation, people tend to move down the hierarchy of needs before acquiring the higher needs (Bob, 2009).

According to Maslow (1943), physiological needs are biological, and required to fulfill life's basic needs, such as oxygen, water, and food. Likewise, perceived scarcity refers to the perceived supply level of physical resources that are essential to an individual's normal functioning (Mehta and Zhu, 2016). Therefore, perceived scarcity can be classified under physiological needs.

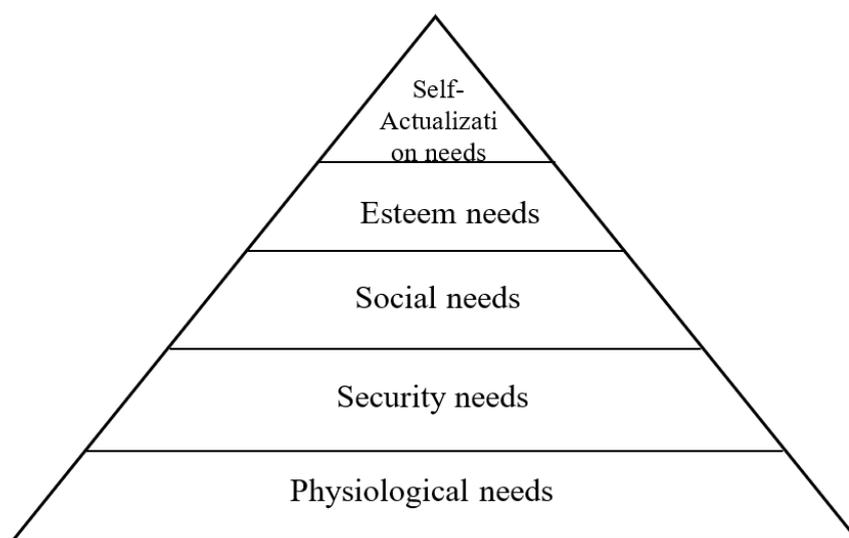
According to Maslow (1943), if people can adequately meet their physiological needs, a new category will emerge, known as security needs. Security needs also require maintenance throughout life, like physiological needs, which are more psychological (Bob, 2009). Perceived severity refers to the consequences of the adverse effects of the COVID-19 pandemic on individual well-being, such as job security and economic conditions, family relationships, and psychological health (Li et al., 2021). Perceived severity proposes that individuals are motivated to protect themselves when facing potential hazards from the environment, to improve their safety and well-being (Gellman, 2013). Thus, the perceived severity is relevant and appropriate to be classified under security needs.

After the security and physiological needs are fulfilled, Maslow stated that social needs and the feeling of belonging to a specific group are the third level of human needs. This includes giving and receiving affection, trust, friendship, acceptance, and intimacy. Maslow also mentions affiliation or being part of families, friends, and work as a social need. Maslow (1943) divides the demand for esteem into two categories. The first comprises a desire for self-sufficiency, accomplishment, power, independence, and freedom. The second is for status and renown (regard from others), attention, recognition, significance, or respect.

When these needs are fulfilled, individuals gain confidence and feel appreciated by society. However, when someone feels deprived, they will feel unvalued, weak, and powerless (Bob, 2009). This study uses social media as a component of social needs, because they contain elements of social relations to motivate one's behavior.

According to Maslow (1943), the last need is good self-actualization. This need refers to the desire for self-fulfillment, i.e., a person's tendency to fully optimize his/her potential. This inclination is described as the willingness to be more capable (Maslow, 1943). Multiple studies conducted by Lester et al. (1983) and Locke (1997) demonstrated that the accomplishment of control strengthens an individual's belief in their ability to control events, thereby boosting their self-confidence and morale and satisfying their esteem requirements. Since control significantly impacts an individual's self-esteem, it can be categorized under esteem needs.

Figure 1. Theory of Maslow's Hierarchy of Needs



(Source: Maslow, 1943)

Effect of Control on Panic-Buying Behavior

Gabrys et al. (2018) refer to control as an individual's perceived ability to exercise control over negative invasive thoughts and emotions, and their ability to deal with traumatic situations. Yuen et al. (2021) stated that many circumstances, such as a pandemic, will undermine one's perception of control over one's environment. The reduced perception of control will create discomfort and anxiety, further motivating the individual to regain control. This is because the COVID-19 pandemic made many people feel helpless in many respects.

The compensatory control theory posits that people desire control over their situation by solving problems. Problem-solving increases one's confidence in regaining control over one's situation. Two conditions must be met for panic buying to be considered problem-solving to regain lost control (Andy and Chen, 2020). First, the action must be performed by the individual directly. Second, the act must be believed to attain an ideal state to re-establish control of a situation with diminished control. The first criterion is met because consumers routinely purchase products, such as daily necessities, while expending minimal financial or cognitive resources (deliberate action). The second criterion is also met because purchasing consumption goods is practical.

Although purchasing large quantities of consumer goods is maladaptive (Kennett-Hensel, Sneath and Lacey, 2012), because it does not help or may even worsen the shortage of supplies in the market, it gives individuals indirect control over their situation, as the majority of these goods can be used to mitigate the health crisis or used in the future. In conclusion, panic buying can be regarded as a compensatory consumption behavior, suggesting that individuals purchase products to compensate for deficits caused by perceived requirements and desires that can only be met indirectly (Koles, Wells, and Tadajewski, 2018). In this context, the deficit refers to losing control over the circumstance, which can be offset by problem-solving strategies such as panic purchasing. This is how the initial hypothesis was developed:

H1: Control negatively affects panic buying behavior.

Effect of Social Media Posts on Panic-Buying Behavior

According to experts, social media make individuals more apprehensive about the future, which affects inventory levels (Reuters, 2020). Excessive posting of hoarding on social media by friends, family, and strangers can increase FOMO (Fear of Missing Out) and induce panic purchasing (Helmke et al., 2020). Based on the socially constructed meaning of COVID-19, consumer panic purchasing behavior increased globally, resulting in hoarding behavior (Naeem, 2021).

Social media posts are also pertinent to the crowd psychology theory, in which the frantic purchasing of necessities during a health crisis is characterized as “going with the flow” or “following the crowd” (Cheng, 2004). Stories about hoarding and images of empty shelves, disseminated by the media, may suggest that others are only concerned with themselves, inciting a desire to engage in the same behavior, such as hoarding. According to the crowd psychology theory, crowds can result in a loss of behavioral control, self-interest, and distraction (Drury, Novelli, and Stott, 2013). Observed shopping behavior in media communications, such as official news and social media, frequently indicate pop-

ulation behavior (Smith and Klemm, 2020). Consequently, consumers employ this social proof heuristic to revise their beliefs about purchasing behavior regarding the quantity and frequency of purchases (Cao et al., 2020).

H2: Social media posts positively affect panic buying behavior.

The Perceived Severity's Effect on Panic Buying

Fear, depression, anxiety, and stress have emerged as psychological risk factors for contracting COVID-19 due to the outbreak of the disease (Mamun et al., 2022). Dsouza et al. (2020) identify educational stress, unemployment, relationship issues, and poverty as common underlying causes of psychiatric disorders. In research about consumer behavior, experts have found that perceived severity can increase an individual's level of purchasing decisions, to eliminate negative emotions, including feelings of stress, discomfort, security, and fear (Sneath, Lacey, and Kennett-Hensel, 2009). Yuen et al. (2021) also found that a pandemic threatens an individual's needs in life, leading to increased fears. As a result, people feel anxious and panic buy. In a pandemic, individuals think about the threat of contracting the disease when the disease is spreading. This threat can trigger them to make panic purchases of safety products, to protect themselves from potential harm and take preventive measures. Therefore, the following hypothesis is presented.

H3: Perceived severity positively affects panic buying behavior.

The Effect of Perceived Scarcity on Panic Buying Behavior

According to Yuen et al. (2020), perceived scarcity is connected to the reactance theory (Brehm and Brehm, 1981), which argues that if there is a threat to a person's freedom of behavior, the individual experiences psychological reactance. Psychological reactions are motivational states designed to retrieve an individual's freedom of action (Gupta and Gentry, 2019). Li et al. (2021) revealed that a feeling of losing the freedom to be involved in a specific behavior makes a person more willing to retrieve his/her liberty. In reality, necessities were crucial during the COVID-19 pandemic. It was also predicted that there would be shortages of goods within a short period. As such, there was a tendency for people to act on their panic buying behavior, due to the fear of resource insufficiency. The moment a person realizes the possibility of certain goods being inaccessible, he/she will think about excessive buying when the products are still available to maintain their freedom (Yuen et al., 2020). Under the phenomena mentioned above, the following hypothesis is presented.

H4: Perceived scarcity positively affects panic buying behavior.

The Moderating Role of Government Intervention

According to Duan et al. (2020), government intervention is when the government advises or mandates that the public and private sectors take specific measures to limit the severity or spread of a pandemic's effects. As a precaution against the spread of the COVID-19 pandemic, the government implemented stringent health measures, such as social isolation and lockdowns (Dickins and Schalz, 2020; Gupta and Gentry, 2019; Keane and Neal, 2021). However, these actions also disrupted the supply chains and halted the global economy (Barua, 2020). The extreme scarcity of masks and sterilizers, as well as alarming news reports, contributed to increased anxiety and fear (Cao et al., 2020), resulting in a change in purchasing behavior, to panic buying, as a psychological response (Cao et al., 2020; Ventriglio, Watson and Bhugra, 2020). According to Prentice, Quach, and Thaichon's (2020) research, most of the respondents in five countries (Australia, China, India, Vietnam, and Indonesia) who engaged in panic buying agreed that government intervention was the cause of their behavior. Based on the above concept, four hypotheses are proposed in this study.

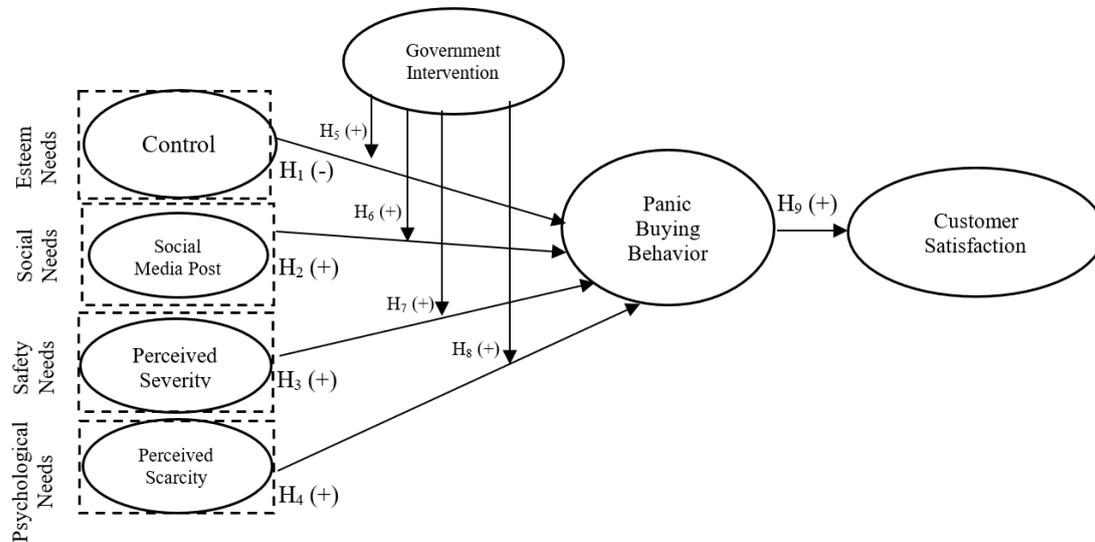
- H5:** Government intervention moderates the effect of control on panic buying behavior.
- H6:** Government intervention moderates the effect of social media posts on panic buying behavior.
- H7:** Government intervention moderates the perceived severity's effect on panic buying behavior.
- H8:** Government intervention moderates the perceived scarcity's effect on panic buying behavior.

The Effect of Panic Buying Behavior on Customer Satisfaction

Kotler and Keller (2016) define satisfaction as a person's sentiments of joy or disappointment caused by comparing a product or service's perceived performance (or results) to their expectations. The research results conducted by Ardyan et al. (2021) show that customers' panic buying behavior can affect customer satisfaction. This research shows that when a consumer engages in panic buying behavior and gets what he/she wants, his/her level of satisfaction increases. Ardyan et al. (2021) revealed that people must do various things to fulfill their life and living needs during a crisis, such as a pandemic. If they can perform hoarding behavior, they will be pleased to do it. Along with the items they get, their satisfaction will increase as well. Therefore, the following hypothesis is presented.

- H9:** Panic buying behavior positively affects customer satisfaction.

Figure 2. Research Model



Method

The study used Maslow's hierarchy of needs theory to examine the consumers' perspective of panic buying behavior. This study used a quantitative approach. According to Neuman (2014), quantitative studies tend to follow the principle of positivism and utilize variables and hypotheses. The emphasis is on proper variable measurement and hypothesis testing. This study used structural equation modeling (SEM) and SmartPLS 3.0. as the analytical tools.

This study used primary data as the type of data. The population in this study were people on the islands of Java and Bali, Indonesia. The analysis unit in this research was at the consumer level. A sample, according to Neuman (2014), is a small group of cases selected by researchers from a large group, and generalized to the population. Non-random sampling was utilized as the sampling approach for this investigation. The data were collected through an online survey using Google Forms. In order to reach a broader range of respondents, the questionnaires were distributed via social media (Instagram, Twitter, and WhatsApp) and the Kudata.id platform. The questionnaires were also in Indonesian, instead of English, to make it easier for the respondents to understand.

This study used the sampling technique known as purposeful sampling. This study used three sample criteria. First, the people living in Java and Bali were at least 18 years old. Second, consumers of grocery and drug stores who went shopping during the period from January to March 2022. Third, users of one, two, or three social media platforms (Facebook, Instagram, and Twitter). The sample in this study was people who lived in Java

and Bali because there was a government regulation in the form of an Instruction from the Minister of Home Affairs (Inmendagri), namely PPKM (Pemberlakuan Pembatasan Kegiatan Masyarakat), so this was relevant and had an influence on panic buying behavior. The sample chosen was social media users (Facebook, Instagram, and Twitter) who were at least 18 years old, because this research examined how social media affected panic buying behavior.

The sample size used in this study followed the minimum adequacy for sample size in partial least squares (PLS) and structural equation modeling (SEM). According to Hair et al. (2014), the minimum size for a sample is at least 10 times more than the total number of question items to be analyzed. This study had 39 questions, so the required sample size was at least 390. Four hundred and sixty questionnaires were distributed from April 14, 2022, to June 7, 2022, but only 456 complied with the research criteria. These 456 questionnaires met the minimum requirements in determining the sample size in the structural equation. After obtaining the data, the researcher conducted a descriptive statistical analysis to observe the overview of the data's distribution from each item of the research data, using SPSS 21 and Microsoft Excel. Furthermore, the researcher also used WarpPLS 7.0 to analyze the outliers and missing values.

Measurement

Each item used in this study was derived from previous studies and measured using a 5-point Likert scale. The Likert scale, according to Sekaran and Bougie (2014), is a scale designed for discovering respondents' attitudes toward a statement. The criteria for each point used were 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, and 5=strongly agree. This research addressed seven constructs: control, social media posts, perceived severity, perceived scarcity, government intervention, panic buying behavior, and customer satisfaction.

Table 1. Demographic Analysis

Construct	ID	Measurement Items	Source
Gender	CON1	I feel that I cannot control what is happening	Kemp, Kennett-Hensel and Williams (2014)
	CON2	I feel like the situation is out of my control	
	CON3	I feel like that is all I can do	
	CON4	I am nervous and confused.	
Social Media Posts	MED1	Social media create and influence the phenomena of panic buying behavior	Arafat et al. (2021)
	MED2	Anxieties about social media drive panic buying behavior	
	MED3	Spreading fear on social media of not having a product encourages panic buying behavior	
	MED4	I panic when seeing photos and videos of empty shelves of necessities on social media	
	MED5	Feelings of uncertainty during the COVID-19 pandemic have affected my buying habits	
Perceived Severity	SEV1	If I get COVID-19, it will threaten my career	Huang et al. (2016)
	SEV2	If I get COVID-19, it will affect my relationship with my family and friends	
	SEV3	If I get COVID-19, the security of my finances will be affected	
	SEV4	It will change my whole life if I get COVID-19	

Construct	ID	Measurement Items	Source
Perceived Scarcity	CAR1	The product that I desire will be scarce during the COVID-19 pandemic	Byun and Sternquist (2008)
	CAR2	The accessibility of brands for a product will be difficult during COVID-19	
	CAR3	Product size will be minimal during COVID-19	
	CAR4	Product type will be minimal during COVID-19	
Government Intervention	GOV1	With the aim of increasing public awareness and suggesting protective measures against COVID-19, the government uses banners	Duan et al. (2020)
	GOV2	With the aim of increasing public awareness and suggesting protective measurement against COVID-19, the government uses television broadcasts	
	GOV3	With the aim of increasing public awareness and suggesting protective measures against COVID-19, the government uses brochures	
	GOV4	With the aim of increasing public awareness and suggesting protective measures against COVID-19, the government uses text messages	
	GOV5	The government organizes health personnel for the precaution and control of COVID-19	
	GOV6	The government organizes community workers to take precautions against and control COVID-19	

	GOV7	The government organizes social organizations to take precautions against and control COVID-19	
	GOV8	The government organizes volunteers to take precautions against and control COVID-19	
	GOV9	The government organizes property owners to take precautions against and control COVID-19	
	GOV10	The government organizes scholars and professional experts to take precautions against and control COVID-19	
	GOV11	The government has appointed a hospital to receive and treat COVID-19 patients	
	GOV12	The government has designated a hospital for medical observation of patients with suspected COVID-19	
	GOV13	The government has provided psychological services for psychological counseling	
Panic Buying Behavior	PAN1	The feeling of fear encourages me to purchase things excessively and stock up at home	Lins and Aquino (2020)
	PAN2	Scared of not acquiring the product I need drives me to purchase more goods	
	PAN3	I panicked when I thought that essential products might be out of stock; therefore, I chose to purchase them in massive numbers	
	PAN4	The feeling of fear drove me to buy more than usual	
	PAN5	Panic drove me to purchase more stuff than usual	

	PAN6	Feelings of uncertainty drive panic buying	
Customer Satisfaction	CUS1	Overall, I am satisfied that I made a purchase during the COVID-19 pandemic	Ardyan et al. (2021)
	CUS2	The performance of the product I purchased met my expectations	
	CUS3	The performance of the product I purchased exceeded my ideal expectations	

Results

Validity and Reliability Test

This study used two validity tests, namely the validity test of the convergent variable and the validity test of the discriminant variable. Table 2 presents the findings of the convergent validity test, while Table 4 displays the results of the discriminant validity test. Hair et al. (2018) state that the factor loading and AVE value reflect the results of the construct's validity testing. The accepted AVE value is ≥ 0.5 , and the accepted factor loading value is ≥ 0.708 .

Based on the convergent validity test results, Table 2 shows that several measurement items have a factor loading value of less than 0.70, namely items SM4, GI1, GI2, GI3, GI4, and GI13, with factor loading values of 0.659, 0.574, 0.678, 0.363, 0.518, and 0.357. However, in social studies, factor loading values between 0.40 and 0.70 are scaled using the combined reliability results or the average variance extracted (AVE) if they exceed the recommended thresholds. The result can still be considered for removal (Hair et al., 2014). Therefore, only IP3 and IP13 statement items were removed from the measurement, to see the average variance extracted (AVE) results. The findings in Table 3 present the extracted mean-variance test. After removing IP3 and IP13 from the measurement, Table 3 shows that the AVE results fulfilled the minimum criteria, which was higher than 0.5.

Table 2. Convergent Validity

Construct	Item	Convergent Validity	
		AVE	Factor Loading
Control	CON1	0.631	0.809
	CON2		0.826
	CON3		0.803
	CON4		0.737
Social Media Posts	MED1	0.550	0.787
	MED2		0.725
	MED3		0.722
	MED4		0.659
	MED5		0.805
Perceived Severity	SEV1	0.651	0.824
	SEV2		0.784
	SEV3		0.793
	SEV4		0.825
Perceived Scarcity	CAR1	0.774	0.865
	CAR2		0.897
	CAR3		0.863
	CAR4		0.893
Government Inter-vention	GI1	0.442	0.574
	GI2		0.678
	GI3		0.363
	GI4		0.518
	GI5		0.783
	GI6		0.810
	GI7		0.796
	GI8		0.799
	GI9		0.716
	GI10		0.716
	GI11		0.671
	GI12		0.669
	GI13		0.363
Panic Buying Behavior	PAN1	0.798	0.878
	PAN2		0.902
	PAN3		0.905
	PAN4		0.809
	PAN5		0.826
	PAN6		0.803

Customer Satisfaction	CUS1	0.634	0.836
	CUS2		0.687
	CUS3		0.927

Table 3. Extracted Average Variable (AVE)

Construct	AVE
Control	0.631
Social Media Posts	0.550
Perceived Severity	0.651
Perceived Scarcity	0.774
Government Intervention	0.501
Panic Buying Behavior	0.798
Customer Satisfaction	0.634

The next validity test was the discriminant validity test using the Fornell-Lacker criteria. The square root of AVE for each construct was higher than the highest correlation with the other constructs. Table 5 reveals that AVE's square root for each construct was higher than the highest correlation of the different constructs, thus fulfilling the Fornell-Lacker criteria.

Table 4. Discriminant Validity

	GOV	CUS	CON	PAN	SEV	CAR	MED
GOV	0.209						
CUS	0.341	0.796					
CON	0.065	0.092	0.794				
PAN	0.164	0.104	0.507	0.893			
SEV	0.321	0.052	0.381	0.427	0.807		
CAR	0.193	0.125	0.277	0.463	0.301	0.880	
MED	0.708	0.068	0.527	0.639	0.328	0.338	0.741

The next test was the construct's reliability test. Cooper and Schindler (2014) mention that the reliability test determines the consistency of the measuring instruments applied in a study. Reliability testing in this study used the rule of thumb from Hair et al. (2014), by analyzing composite reliability values of greater than 0.7. Composite reliability can be considered reliable when a structural equation model represents a measure of reliability in a study.

Table 5. Composite Reliability

Construct	Reliability	Conclusion
Control	0.872	Reliable
Social Media Posts	0.859	Reliable
Perceived Severity	0.882	Reliable
Perceived Scarcity	0.932	Reliable
Government Intervention	0.916	Reliable
Panic Buying Behavior	0.959	Reliable
Customer Satisfaction	0.837	Reliable

Characteristics of Respondents

The respondents in this study were 456 people obtained from online surveys via Google Forms. Of the 456 respondents, 73.9% were male and 26.1% female. By age, 25.4% were under 20 years old, 53.9% were 20 to 25 years old, 13.6% were over 25 to 30 years old, 4.2% were over 30 to 35 years old, 1.8% were around 35 to 40 years old, and 1.1% were over 40 years old. Based on domicile, 35.7% lived in East Java, 12.7% lived in Central Java, 17.3% lived in DI Yogyakarta, 21.5% lived in West Java, 17.3% lived in DKI Jakarta, and 3.3% lived in Bali. Regarding their education, 0.2% were junior high school graduates, 54.6% were high school graduates, 8.1% were diploma graduates, 34.4% were undergraduate graduates, and 12% were postgraduate graduates. Regarding their monthly income, 40.8% had no income, 16.2% earned < IDR 1,000,000, 18.6% earned between IDR 1,000,000 to IDR 2,500,000, 16% earned between > IDR 2,500,000 to IDR 5,000,000, 4.2% earned between > IDR 5,000,000 to IDR 7,500,000, and 4.2% earned > IDR 7,500,000.

Structural Model Testing

Hair et al. (2014) state that there is no goodness of fit criterion in evaluating the overall model using PLS-SEM, so research hypothesis testing using the PLS-SEM method must first be tested for the model's fit (model fit). The model indicator can be fit if the standardized root mean square residual (SRMR) has a p-value below 0.1 or 0.08 (Hu and Bentler, 1998). According to the test's finding, Table 6 displays that the value of SRMR was 0.068, so it was declared appropriate because it met the standardized root mean indicator criteria.

Table 6. Model Fit

	<i>Saturated Model</i>	<i>p-value</i>
SRMR	0.058	0.068
d_ULS	2.581	3.580
d_G	1.085	1.107
Chi_Square	2,774.015	2,843.022
NFI	0.785	0.780

The study uses path coefficient analysis for testing the hypotheses. The value of the path coefficient defines the significance level in hypothesis testing. Cooper and Schindler (2014) say that the proposed hypothesis is accepted if the significance level has a p-value of ≤ 0.05 . Based on these criteria, a hypothesis is supported if a construct's effect on another construct has a critical ratio (CR) value ≥ 1.96 at a significance level of 0.05. **Table 7** presents the results of the hypotheses testing.

Table 7. Hypothesis Testing Through Path Coefficient

Construct	Standardized Regression Weight (β)	Standard Deviation (STDEV)	T-Statistics (O-STDEV)	p-values
CON→PAN	-0.099	0.047	2.215**	0.027
MED→PAN	0.438	0.045	9.609**	0.000
SEV→PAN	0.125	0.042	2.918**	0.004
CAR→PAN	0.164	0.043	3.819**	0.000
CON→GOV→PAN	-0.040	0.049	0.828	0.408
MED→GOV→PAN	0.083	0.041	2.136**	0.033
SEV→GOV→PAN	-0.032	0.055	0.594	0.553
CAR→GOV→PAN	-0.044	0.043	1.047	0.295
PAN→CUS	0.258	0.054	4.796**	0.000

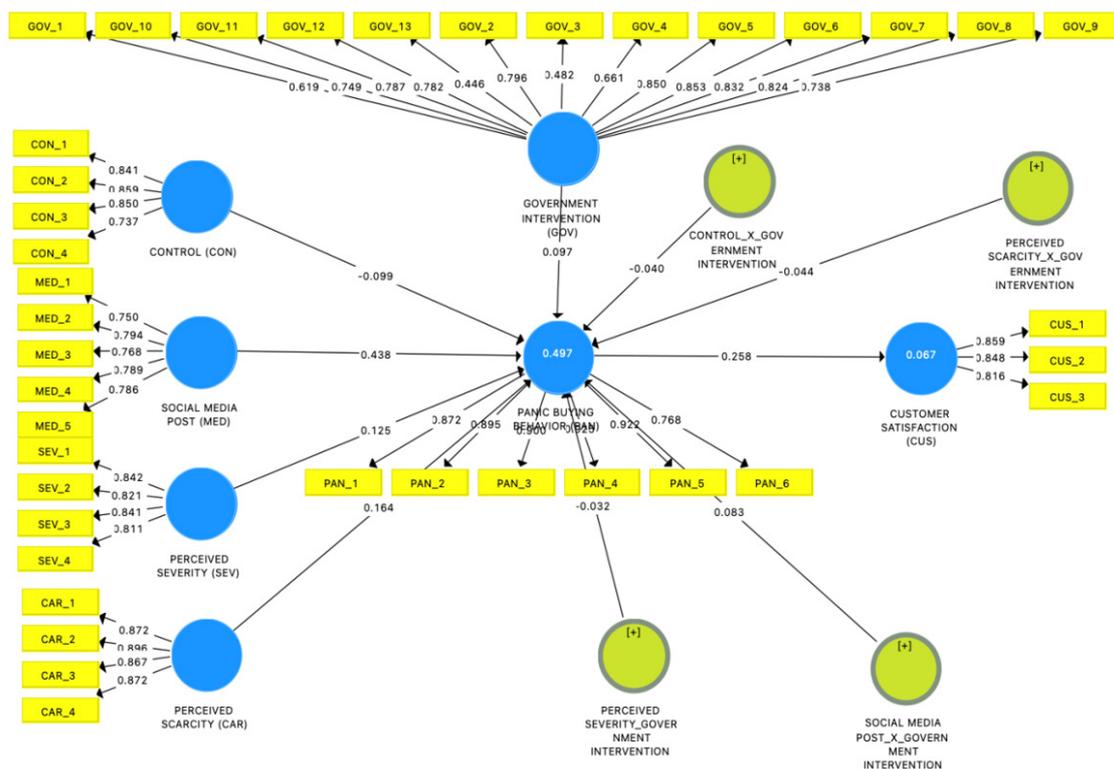
Notes: **Significant at 0.05 (2-tailed).
 CON = Control; MED = Social Media Posts; SEV = Perceived Severity; CAR = Perceived Scarcity; PAN = Panic Buying Behavior; GOV = Government Intervention; CUS = Customer Satisfaction.

Table 7 shows that $\beta = -0.099$; p-value < 0.05 ; $CR \geq 1.96$, which meant that the control negatively and significantly affected panic buying behavior. As such, **H1 is supported**. In line with H1, social media posts positively and significantly affected panic buying behavior with $\beta = 0.438$; p-value < 0.05 ; $CR \geq 1.96$. Therefore, **H2 is supported**. In addition, the perceived severity also positively and significantly affected panic buying behavior statistically. So, **H3 is also supported**. Furthermore, perceived scarcity positively and significantly affected panic buying behavior. This result indicates that **H4 is supported**.

As for the moderating variable of government intervention, it appeared as a significant factor that strengthened the influence of social media postings on panic-buying behavior ($\beta=0.083$; p -value <0.05 ; $CR \geq 1.96$). This means **H6 is supported**. However, the other moderating effects of government intervention, which are **H5, H7, and H8, are not supported** with $\beta=-0.040$; p -value > 0.05 ; $CR \leq 1.96$ for H5, $\beta=0.032$; p -value > 0.05 ; $CR \leq 1.96$ for H7, and $\beta=-0.044$; p -value > 0.05 ; $CR \leq 1.96$ for H8. Lastly, panic buying behavior positively and significantly affected customer satisfaction, with $\beta=0.258$; p -value <0.05 ; $CR \geq 1.96$. As a result, it showed that **H9 is also supported**.

Based on the estimation results of the structural equation model using the maximum likelihood method, six of the hypotheses proposed in this study, namely H1, H2, H3, H4, H6, and H9, are empirically supported. Meanwhile, the hypothesis testing results showed that the other three hypotheses, H5, H7, and H8, are not supported. Figure 3 below displays the estimation results of the structural equation model.

Figure 3. Structural Equation Model (bootstrapping)



Discussion of Results

Table 8. Summary of Hypothesis Testing Results

Constructs	Hypothesis Testing Results
H1 (Control negatively affects panic buying behavior)	Supported
H2 (Social media posts positively affect panic buying behavior)	Supported
H3 (Perceived severity positively affects panic buying behavior)	Supported
H4 (Perceived scarcity positively affects panic buying behavior)	Supported
H5 (Government intervention moderates the effect of control on panic buying behavior)	Not Supported
H6 (Government intervention moderates the effect of social media posts on panic buying behavior)	Supported
H7 (Government intervention moderates the perceived severity effect on panic buying behavior)	Not Supported
H8 (Government intervention moderates the perceived scarcity effect on panic buying behavior)	Not Supported
H9 (Panic buying behavior positively affects customer satisfaction)	Supported

Hypothesis 1: Control negatively affects the phenomenon of panic buying behavior.

Hypothesis 1 is supported. The results of this research are related to the theory of compensatory control, which argues that people bought hastily during the COVID-19 pandemic, to retrieve control of their situation. Problem-solving is one of the best ways to take control or reclaim it again for their position. Yuen et al. (2021) show that problem-solving strengthens a person's belief in retrieving control of his or her life. Panic buying behavior can be considered to be problem-solving, because individuals can do it. In summary, panic buying is also part of compensatory consumption behavior, in which individuals turn to purchasing products to compensate for deficits caused by their perceived needs and desires that are only indirectly being met (Yuen et al., 2020). As for this case, a deficit means losing control over control and, thus, can only be retrieved through panic buying as a problem-solving solution.

Hypothesis 2: Posts on social media positively affect panic buying behavior.

Hypothesis 2 is supported. This is because this research was conducted during January to March 2022, when there was an increase in cases of the Omicron variant of COVID-19, so the Enforcement of Community Activity Restrictions (PPKM) policy was applied on the islands of Java and Bali. The PPKM policy enhances the role of social media, to increase interaction and the exchange of information among individuals. Roy Nicholas Mandey, chairman of the Indonesian Retailers Association (Aprindo), stated on Kompas.com that panic purchasing occurred in at least several locations, including Jakarta, Depok, Tan-

gerang, Bekasi, Bogor, Surabaya, and Semarang. Consequently, there was an average significant increase in purchases, particularly of masks and hand sanitizers. According to Roy, panic purchasing occurs when apprehensive individuals fall victim to social media hoaxes. Society devolves into irrational paranoia, irrational dread, and irrational hasty decision-making. Cogley (2020) and Mao (2020), in Naeem, 2021, explain that social media allow various features for people to communicate with each other, such as images, audio, videos, chats, tweets/retweets, tags, sharing, and likes. The platforms also provide people from many professions, politicians, celebrities, government officials, the media, and others, with ways to share information and interests. Concerning that, many people share their experiences or activities on social media, which leads to panic buying behavior. Barr (2020), in Naeem (2021), reports that many American users on Twitter shared images of empty shelves at Costco supermarkets during the COVID-19 pandemic. Consequently, many people started to buy products on a large scale, putting pressure on suppliers and supermarkets worldwide.

Hypothesis 3: Perceived severity positively affects panic buying behavior.

Hypothesis 3 is supported. Chua et al. (2021) mention the perceived severity of the loss level due to infection with COVID-19. It measures consumers' conceptions of the impact of COVID-19 infection on one's job, finances, relationship with families and friends, and the upcoming events in one's life. This also affects the anxiety a person feels when faced with the possibility of getting infected by COVID-19. The condition indicates that the pandemic created psychological issues, including anxiety, depression, fear, and stress about being infected with COVID-19. The common implicit psychiatric problems of contracting COVID-19 come from unemployment, educational stress, poverty, and relationship problems. (Chua et al., 2021). Dsouza et al. (2020) highlight that those fears about getting infected by COVID-19 provide a crucial reason for suicide, rather than financial problems. Other essential risk considerations also come from family disputes, social rejection, and fear of being unable to go home. In addition, consumers might also experience pessimism for the future, due to the discouraging social environment and negative psychological, economic, and emotional states. That will lead to thinking about the worst scenarios. Following that issue, people will think there will be an inaccessible supply chain, and recognize the socially undesirable increase in behavior in other people, such as hoarding and panic buying. So it can be concluded that the perceived severity of consumers can cause panic buying behavior, to protect themselves rather than paying attention to the interests of others. The results of this research correspond with prior studies investigating the psychological factors influencing panic buying. Nguyen et al. (2022) found that there is a positive correlation between perceived severity and panic buying. This study has, once again, consolidated the positive relationship between perceived severity and panic buying.

Hypothesis 4: Perceived scarcity positively affects panic buying behavior.

Hypothesis 4 is also supported. The results of this study confirm Brehm's (1966) reactance theory, which suggests that when people are aware of the available resources, they have more freedom and choice to look among the available products. They will also be less motivated to panic buy. Sufficient supply to meet demand shows the low probability of an increased price due to the surplus supply. During the COVID-19 pandemic, goods became scarce and difficult to access for some time, so the perceived scarcity by consumers drove the panic buying behavior. This finding also aligns with the interview conducted by Patiro et al. (2022). During the first observation period, from April 2020 to May 2020, 30 respondents from Jakarta, Tangerang, and Banten were interviewed online. In three separate sessions, these interviews were conducted with the Zoom meeting application. There were 10 participants in each session. The interviews revealed that most individuals who exhibited panic-buying behavior were affected by a transient emotional episode, caused by the perceived scarcity of essential products, the influence of others, specific information, and their knowledge of the subject at hand.

Hypothesis 5: Government intervention moderates the effect of controls on panic buying behavior.

The results of the path coefficient analysis indicate that there is no support for Hypothesis 5. The control variable is the individual's ability to insert dominance over one's negative emotions and intrusive thoughts, as well as the ability to cope with traumatic situations (Gabrys et al., 2018). The process of self-control refers to a managed reflective system. Self-control allows a person to evaluate whether he/she is in control of the current situation, prevent impulsive reactions (e.g., panic buying), and conform to the first norm (Soror et al., 2015). The existing literature suggests that consumers with low levels of self-control are more susceptible and persuasive to external factors than consumers with high levels of self-control. (Li et al., 2021). The reason lies in the vision for long-term goals, as possessed by consumers with high levels of self-control. They tend to make rational decisions and avoid external influences, or changes, for one example.

In contrast, consumers will try to retrieve control of the current situation if they lose their self-control. Based on the reasons above, it can be concluded that the presence, or absence, of government intervention will not change the effect of control on panic buying behavior. Consumers will create rational decisions and avoid external influences, or changes by government intervention.

Hypothesis 6: Government intervention moderates the effect of social media posting on panic buying behavior.

Hypothesis 6 is supported. These results explain that government intervention will strengthen the influence between social media postings and panic buying behavior. This study's results align with research conducted by Prentice et al. (2021) in four countries, namely Indonesia, China, Australia, and India, to examine the role and government support for panic buying behavior. The research results show that since the first two COVID-19 cases in Indonesia, in March 2020, there was a wave of panic shopping in supermarkets and drug stores. People in Jakarta shared their experience, where people excessively shopped for many goods and supplies to stockpile, amid fears of a possible COVID-19 virus outbreak. Their panic buying is associated with their observation of other people making panic purchases in supermarkets, and sending news or pictures of panic buying situations in supermarkets or drug stores (The Jakarta Post, 2020), thus reinforcing them to make panic purchases.

Hypothesis 7: Government intervention moderates the effect of perceived severity on panic buying behavior.

The results of the path coefficient analysis indicate that there is no support for Hypothesis 7. So, the presence or absence of the government's role did not change the effect of the perceived severity on panic buying behavior. Several reasons could cause this. First, the perceived severity is linked to how severe the consequences are that accompany an individual during a health crisis. As in the COVID-19 pandemic, there is an increased risk perception. That said, the brain will identify a threatening condition in the cognitive process, leading to decreased control over cognitive function and performance (Yuen et al., 2021). Second, Dsouza et al. (2020) highlight that the fear of getting infected by COVID-19 has several risks, such as family disputes, social rejection, the burden of being unable to go home, and even suicide. Individual perceptions of this cause consumers to feel pessimistic about future events, causing them to imagine worst-case scenarios. For the above two reasons, it can be concluded that the presence or absence of intervention by the government will not change the perceived severity's effect on the phenomenon of panic buying.

Hypothesis 8: Government intervention moderates the effect of perceived scarcity on the phenomenon of panic buying behavior.

Hypothesis 8 is also not supported. Therefore, the presence or absence of the government's role did not change the effect of scarcity perceptions on panic buying behavior. The perceived scarcity is closely related to Brehm's (1966) reactance theory, which states that an individual experiences a reactance of psychology that refers to a motivational state to

secure behavioral freedom when threatened or prohibited. As for this case, products were predicted to be unavailable within a short period of time due to the health crisis. That condition would create a threat to an individual's freedom. (i.e., prevent or reduce access to the product). As a result, the condition will signal the psychological reactance to be more attracted and interested in the product. It triggers a feeling of urgency to stockpile, similar to panic buying (Pan et al., 2020).

Moreover, another theory linking perceived scarcity to panic buying is regret anticipation (Yuen et al., 2020). According to Wang et al. (2019), emotional consequences are valued when deciding something in unsettled conditions. Consistent with the prospect theory, people will more likely experience regret than joy at not making a panic purchase because of perceived scarcity during the outbreak of a disease. Therefore, the above two reasons, namely psychological reactions, and anticipated regret, can be why the presence or absence of government intervention will motivate individuals to panic buy.

Hypothesis 9: Panic buying behavior positively affects customer satisfaction.

Hypothesis 9 is supported. According to the study's findings, when a consumer engages in panic buying behavior and gets what he/she wants, his/her level of satisfaction increases. This satisfaction arises because, during a crisis such as the COVID-19 pandemic, people do different things to fulfill their basic needs (Ardyan et al., 2021). Times of crisis are when they have less control over their purchases. Losing control will create negative feelings and anxieties (Darrat, Darrat, and Amyx, 2016). Consumers will pay less attention to brands, as they panic about losing their basic needs. When they manage to buy the products, a sense of accomplishment will also increase their satisfaction.

Conclusion

The current research aims to identify the factors influencing consumers' panic buying behavior during the COVID-19 pandemic, and examine their interrelationships. By applying Maslow's hierarchy of needs theory, this study proposes the factors that explain consumers' panic purchasing behavior. Basically, this study aims to examine the effect of control, social media posts, perceived severity, and perceived scarcity on panic buying behavior, the impact of panic buying behavior on customer satisfaction, and the moderating effect of government intervention.

The unit of analysis used in this study is at the individual level. An online survey was conducted in Indonesia using Google Forms. The questionnaires were distributed from April 14, 2022, to June 7, 2022, and received 456 valid data points. The outcome indicates that control negatively affects panic buying behavior. Furthermore, social media,

perceived severity, and perceived scarcity positively affect panic buying behavior. The government intervention variable only moderated the effect of social media on panic buying. Finally, the phenomenon of panic buying significantly affects customer satisfaction.

Theoretical Implication

The study makes a significant contribution to academic research. First, it bridges a critical gap in the literature on consumer panic buying behavior by introducing Maslow's hierarchy of needs theory to understand the factors influencing it. There are only a few studies on consumer buying behavior. From a limited number of theoretical studies, most research has focused primarily on the psychological and social causes of panic buying behavior, rather than the motivational needs of individuals in the face of threats. This study provides an alternative perspective by introducing Maslow's hierarchy of needs theory to consumer panic buying behavior.

Furthermore, the theory provides an in-depth evaluation of the components influencing consumers' panic buying behavior: control, social media postings, perceived severity, and perceived scarcity. Theoretically, the findings examine the moderating effect of government intervention on control, social media postings, perceived harm, and the perceived scarcity on panic buying behavior. In this case, government intervention only strengthens the effect of social media posts on panic buying behavior. This result means that the more intervention the government makes regarding policies to prevent the expansion of the COVID-19 pandemic, the stronger the impact is on social media posts and panic buying behavior. Finally, this study provides the measurement and operationalization of the measurement items developed through synthesizing the panic buying behavior literature.

Practical Implication

From a policy point of view, this research can provide some suggestions for policymakers, the retail industry, marketers, and individuals about efficiently allocating scarce resources to manage disruptions to strategic and critical goods, while ensuring safe consumer distancing. Policymakers and the retail sector must replenish store shelves to ensure consumers can access essential items. From a media perspective, policymakers must prevent the media from displaying a visual image of out-of-stock situations and spreading fake news that can cause panic among consumers. Thus, this strategy helps limit consumers' perceived severity and scarcity, reducing their panic buying behavior. In addition to the steps above, the government can partner with other institutions to initiate activities to help people maintain positive mental health.

Limitations and Suggestions for Further Research

The data in this study is cross-sectional, using specific criteria in the context of a pandemic. The survey in this research was conducted at the peak of the COVID-19 pandemic, especially the Omicron variant, during the period from January to March 2022, when the panic buying phenomenon was at its peak. Future research may conduct studies over more extended periods, to examine the sustainability of the impact of the crisis, to better understand the motivations behind consumer panic buying behavior. In addition, the subsequent studies can be carried out in contexts other than the COVID-19 pandemic, for example, in other crises and natural disasters. This study uses Maslow's hierarchy of needs theory (1943) approach, to examine the factors influencing panic buying behavior. These factors are only based on individual motivational needs, so further research still has a lot of room to examine other factors regarding the antecedents and consequences of panic buying behavior, using different perspectives and theories. Finally, this study only uses the moderating variable of government intervention to determine the strength of the factors causing panic buying behavior. Therefore, further research can include other moderating variables, such as interventions by retailers and businesses, to see the solid or weak effect of other constructs on panic buying behavior.

References

- Arafat, S.M.Y., A.R. Ahmad, H.R. Murad, and H.M., Kakashekh. 2021. Perceived Impact of Social Media on Panic Buying: An Online Cross-Sectional Survey in Iraqi Kurdistan. *Frontiers in Public Health* 9(5): pp.1–6. <https://doi.org/10.3389/fpubh.2021.668153>.
- Ardyan, E., D. Kurniawan, I. Istiatin, and L. Luhglatno. 2021. Does customers' attitude toward negative eWOM affect their panic buying activity in purchasing products? Customer satisfaction during the COVID-19 pandemic in Indonesia. *Cogent Business and Management* 8(1): 1–16. <https://doi.org/10.1080/23311975.2021.1952827>.
- Barua, S. 2020. Munich Personal RePEc Archive Understanding Coronanomics: The economic implications of the coronavirus (COVID-19) pandemic Understanding Coronanomics: The economic implications of the coronavirus (COVID-19) pandemic. *SSRN Electronic Journal* 1(5): 1-45. <https://doi.org/10.2139/ssrn.399693>.
- Bavel, J.J.V., K. Baicker, P.S. Boggio, V. Capraro, A. Cichocka, M. Cikara, M.J. Crockett, A.J. Crum, K.M. Douglas, J.N. Druckman, J. Drury, O. Dube, N. Ellemers, E.J. Finkel, J.H. Fowler, M. Gelfand, S. Han, S.A. Haslam, J. Jetten, S. Kitayama, D. Mobbs, L.E. Napper, D.J. Packer, G. Pennycook, E. Peters, R.E. Petty, D.G. Rand, S.D. Reicher, S. Schnall, A. Shariff, L.J. Skitka, S.S. Smith, C.R. Sunstein, N. Tabri, J.A. Tucker, S. Linden, S. van der, L.P. van, K.A. Weeden, M.J.A. Wohl, J. Zaki, S.R. Zion, and

- R. Willer. 2020. Using Social and Behavioral Science to Support COVID-19 pandemic response. *Nature Human Behavior* 4(5): 460–471. <https://doi.org/10.1038/s41562-020-0884-z>.
- Billore, S., and T. Anisimova. 2021. Panic buying research: A systematic literature review and future research agenda. *International Journal of Consumer Studies (Special issue)*: 0–28. <https://doi.org/10.1111/ijcs.12669>.
- Bob, P. 2009. An Exercise in Personal Exploration: Maslow's Hierarchy of Needs. *The Surgical Technologist* 41(8): 347–353. Available at: <http://www.ast.org/pdf/308.pdf>.
- Brehm, S.S. and J. W. Brehm. 1981. *Psychological reactance : a theory of freedom and control*. New York: Academic Press.
- Byun, S.E. and B. Sternquist. 2008. The antecedents of in-store hoarding: Measurement and application in the fast fashion retail environment. *International Review of Retail, Distribution and Consumer Research* 18: 133–147. <https://doi.org/10.1080/09593960701868241>.
- Cao, W., Z. Fang, G. Hou, M. Han, X. Xu, J. Dong, and J. Zheng. 2020. The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Research* 287(3): 1–5. <https://doi.org/10.1016/j.psychres.2020.112934>.
- Cheng, C. 2004. To be Paranoid is the Standard? Panic Responses to SARS Outbreak in the Hong Kong Special Administrative Region. *Asian Perspective* 28(1): 67–98. <https://doi.org/10.1353/apr.2004.0034>.
- Chua, G., K.F. Yuen, X. Wang, and Y.D. Wong. 2021. The determinants of panic buying during COVID-19. *International Journal of Environmental Research and Public Health* 18(6): 1–28. <https://doi.org/10.3390/ijerph18063247>.
- Cooper, D.R. and P.S. Schindler. 2014. *Business Research Methods. Twelfth ed.* New York: McGraw-Hill/Irwin.
- Darrat, A.A., M.A. Darrat, and D. Amyx. 2016. How impulse buying influences compulsive buying: The central role of consumer anxiety and escapism. *Journal of Retailing and Consumer Services* 31: 103–108. <https://doi.org/10.1016/j.jretconser.2016.03.009>.
- Dickins, T.E. and S. Schalz. 2020. Food shopping is under risk and uncertainty. *Learning and Motivation* 72(10): 1-9. <https://doi.org/10.1016/j.lmot.2020.101681>.
- Drury, J., D. Novelli, and C. Stott. 2013. Representing crowd behavior in emergency planning guidance: ‘mass panic’ or collective resilience? *Resilience* 1(1): 18–37. <https://doi.org/10.1080/21693293.2013.765740>.
- Dsouza, D.D., S. Quadros, Z.J. Hyderabadwala, and M.A. Mamun. 2020. Aggregated COVID-19 suicide incidences in India: Fear of COVID-19 infection is the prominent causative factor. *Psychiatry Research* 290(5): 17–20. <https://doi.org/10.1016/j.psychres.2020.113145>.

- Duan, T., H. Jiang, X. Deng, Q. Zhang, and F. Wang. 2020. Government Intervention, Risk Perception, and the Adoption of Protective Action Recommendations: Evidence from China's COVID-19 Prevention and Control Experience. *International Journal of Environmental Research and Public Health* Article 17(10): 1–17. <https://doi.org/10.3390/ijerph17103387>.
- Gabrys, R.L., N. Tabri, H. Anisman, and K. Matheson. 2018. Cognitive control and flexibility in the context of stress and depressive symptoms: The cognitive control and flexibility questionnaire. *Frontiers in Psychology* 9(11): 1–19. <https://doi.org/10.3389/fpsyg.2018.02219>.
- Gellman, M.D. 2013. Encyclopedia of Behavioral Medicine. Reference Reviews. <https://doi.org/10.1108/rr-05-2013-0108>.
- Gupta, S., and J.W. Gentry. 2019. 'Should I Buy, Hoard, or Hide?'- Consumers' responses to perceived scarcity. *International Review of Retail, Distribution, and Consumer Research* 29(2): 178–197. <https://doi.org/10.1080/09593969.2018.1562955>.
- Hair, J.F., W.C. Black, B.J. Babin, R.E. Anderson. 2018. *Multivariate Data Analysis. Eighth ed.* London: Pearson. <https://doi.org/10.1002/9781119409137.ch4>.
- Hair, J.F., G.T.M. Hult, C.M. Ringle, and M. Sarstedt. 2014. *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. United States of America: SAGE Publications, Inc.
- Hu, L.T., and P.M. Bentler. 1998. Fit Indices in Covariance Structure Modeling: Sensitivity to Underparameterized Model Misspecification. *Psychological Methods* 3(4): 424–453. <https://doi.org/https://doi.org/10.1037//1082-989x.3.4.424>.
- Huang, H.T., Y.M. Kuo, S.R. Wang, C.F. Wang, and C.H. Tsai. 2016. Structural factors affecting health examination behavioral intention. *International Journal of Environmental Research and Public Health* 13(4): 1–15. <https://doi.org/10.3390/ijerph13040395>.
- Kemp, E., P.A. Kennett-Hensel, and K.H. Williams. 2014. The Calm before the Storm: Examining Emotion Regulation Consumption in the Face of an Impending Disaster. *Psychology and Marketing* 31(11): 933–945. <https://doi.org/10.1002/mar.20744>.
- Keane, M. and Neal, T., 2021. Consumer panic in the COVID-19 pandemic. *Journal of Econometrics* 220(1): 86–105. <https://doi.org/10.1016/j.jeconom.2020.07.045>.
- Kennett-Hensel, P.A., J.Z. Sneath, and R. Lacey. 2012. Liminality and consumption in the aftermath of a natural disaster. *Journal of Consumer Marketing* 29(1): 52–63. <https://doi.org/10.1108/07363761211193046>.
- Koles, B., V. Wells, and M. Tadajewski. 2018. Compensatory consumption and consumer compromises: a state-of-the-art review. *Journal of Marketing Management* 34(1–2): 96–133. <https://doi.org/10.1080/0267257X.2017.1373693>.

- Kotler, P. and K.L. Keller. 2016. *Marketing Management. Fifteenth ed.* Essex: Pearson Education, Inc.
- Lester, D., J. Hvezda, S. Sullivan, and R. Plourde. 1983. Maslow's Hierarchy of Needs and Psychological Health. *The Journal of General Psychology* 109(1): 83–85. <https://doi.org/10.1080/00221309.1983.9711513>.
- Li, X., Y. Zhou, Y.D. Wong, X. Wang, and K.F. Yuen. 2021. What influences panic buying behavior? A model based on dual-system theory and stimulus-organism-response framework. *International Journal of Disaster Risk Reduction* 64(7): 1–10. <https://doi.org/10.1016/j.ijdr.2021.102484>.
- Lins, S., and S. Aquino. 2020. Development and initial psychometric properties of a panic buying scale during COVID-19 pandemic. *Heliyon* 6(9): 04746. <https://doi.org/10.1016/j.heliyon.2020.e04746>.
- Locke, E.A. 1997. Self-Efficacy: The Exercise of Control. *Personnel Psychology*; Autumn.
- Maslow, A.H. 1943. A Theory of Human Motivation. *Psychological Review* 50(4): 370–396.
- Mehta, R. and M. Zhu. 2016. Creating when you have less: The impact of resource scarcity on product use creativity. *Journal of Consumer Research* 42(5): 767–782. <https://doi.org/10.1093/jcr/ucv051>.
- Ming, K.L.Y., and M. Jais. 2022. Factors Affecting the Intention to Use E-Wallets During the COVID-19 Pandemic. *Gadjah Mada International Journal of Business*, [online] 24(1): 82–100. <http://journal.ugm.ac.id/gamaijb>.
- Naeem, M. 2021. Do social media platforms develop consumer panic buying during the fear of the COVID-19 pandemic. *Journal of Retailing and Consumer Services* 58(9): 1–10. <https://doi.org/10.1016/j.jretconser.2020.102226>.
- Neuman, W.L. 2014. *Social Research Methods: Qualitative and Quantitative Approaches. Seventh ed.* England: Pearson Education Limited.
- Nguyen, N., C. Nguyen, P. Khuu, and K. Nguyen. 2022. Panic Purchasing: Food Hoarding in a City under Lockdown during the COVID-19 Pandemic. *Gadjah Mada International Journal of Business*, [online] 24(3): 310–323. <http://journal.ugm.ac.id/gamaijb>.
- Pan, X., M. Dresner, B. Mantin, and J.A. Zhang. 2020. Pre-Hurricane Consumer Stockpiling and Post-Hurricane Product Availability: Empirical Evidence from Natural Experiments. *Production and Operations Management* 29(10): 2350–2380. <https://doi.org/10.1111/poms.13230>.
- Patiro, S.P.S., H. Budiyantri, K. A. Hendarto, and Hendrian. 2022. Panic-Buying Behavior During The Covid-19 Pandemic in Indonesia: A Social Cognitive Theoretical Model. *Gadjah Mada International Journal of Business*, [online] 24(1): 25-55. <http://journal.ugm.ac.id/gamaijb>.
-

- Patricia, S. "Panic Buying" dan "Panic Policy" Rugikan Masyarakat dan Perekonomian. [online]. Available at: <https://www.kompas.id/baca/ekonomi/2020/03/06/panic-buying-akan-rugikan-masyarakat-sendiri> [Accessed 25 April 2023].
- Prentice, C., M. Nguyen, P. Nandy, M. Aswin, Y. Chen, L. Le, S. Dominique-ferreira, and B. Stantic. 2021. Relevant or irrelevant external factors in panic buying. *Journal of Retailing and Consumer Services* 61(1): 1–10. <https://doi.org/10.1016/j.jretconser.2021.102587>.
- Reuters, 2020. Coronavirus effect: UK supermarket visits jump by 79 million before lockdown. [online] Available at: <https://www.indiatoday.in/business/story/coronavirus-effect-uk-supermarket-visits-jump-by-79-million-before-lockdown-1661763-2020-03-31>. [Accessed 24 December 2021].
- Sekaran, U., and R. Bougie. 2014. *Research Methods for Business. Seventh ed.* Encyclopedia of Quality of Life and Well-Being Research. United Kingdom: John Wiley & Sons. https://doi.org/10.1007/978-94-007-0753-5_102084.
- Sirletti S., C. Remondini, and D. Lepido. 2020. Virus outbreak drives Italians to panic-buying of masks and food. [online] Available at: <https://www.bloomberg.com/news/articles/2020-02-24/virus>. [Accessed 3 June 2022].
- Smith, L. and C. Klemm. Even as behavioral researchers, we could not resist the urge to buy toilet paper. [online]. Available at: <https://www.theguardian.com/comment-isfree/2020/mar/05/even-as-behavioural-researchers-we-couldnt-resist-the-urge-to-buy-toilet-paper> [Accessed 19 April 2023].
- Sneath, J.Z., R. Lacey, and P.A. Kennett-Hensel. 2009. Coping with a Natural Disaster: Losses, Emotions, and Impulsive and Compulsive Buying. *Marketing Letters* 20(1): 45–60. <https://doi.org/10.1007/s>.
- Soror, A.A., B.I. Hammer, Z.R. Steelman, F.D. Davis, and M.M. Limayem. 2015. Good habits gone bad: Explaining negative consequences associated with the use of mobile phones from a dual-systems perspective. *Information Systems Journal* 25(4): 403–427. <https://doi.org/10.1111/isj.12065>.
- Taylor, S. 2021. Understanding and managing pandemic-related panic buying. *Journal of Anxiety Disorders* 78(12): 1–8. <https://doi.org/10.1016/j.janxdis.2021.102364>.
- The Jakarta Post, 2020. COVID-19: Police impose limits on staple food purchases amid panic buying. [online] Available at: <https://www.thejakartapost.com/news/2020/03/18/COVID-19-police-impose-limits-on-staple-food-purchases-amid-panic-buying.html> [Accessed 3 December 2022].
- Tsao, Y.C., P.V.R.P. Raj, and V. Yu. 2019. Product substitution in different weights and brands considering customer segmentation and panic buying behavior. *Industrial Marketing Management* 77(9): 209–220. <https://doi.org/10.1016/j.indmarman.2018.09.004>.

- Ventriglio, A., C. Watson, and D. Bhugra. 2020. Pandemics, panic, and prevention: Stages in the life of COVID-19 pandemic. *The International Journal of Social Psychiatry* 66(8): 733–734. <https://doi.org/10.1177/0020764020924449>.
- Wang, Z., X. Liu, S. Zhang, and R. Baños. 2019. A New Decision Method for Public Opinion Crisis with the Intervention of Risk Perception of the Public. *Complexity* 2019. <https://doi.org/10.1155/2019/9527218>.
- Yap, A.J. and C.Y. Chen. The Psychology Behind Coronavirus Panic Buying. [online] Available at: <https://knowledge.insead.edu/economics-finance/the-psychology-behind-coronavirus-panic-buying-13451>. [Accessed 16 April 2023].
- Yuen, K.F., J.Z.E. Leong, Y.D. Wong, and X. Wang. 2021. Panic buying during COVID-19: Survival psychology and needs perspectives in deprived environments. *International Journal of Disaster Risk Reduction* 62(6): 1–12. <https://doi.org/10.1016/j.ijdr.2021.102421>.
- Yuen, K.F., X. Wang, F. Ma, and K.X. Li. 2020. The psychological causes of panic buying following a health crisis. *International Journal of Environmental Research and Public Health* 17(10): 1–14. <https://doi.org/10.3390/ijerph17103513>

Impacts of the Scarcity of Health Appliances on Impulsive Purchases during the COVID-19 Pandemic in Indonesia

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Abstract: At the height of the COVID-19 epidemic in Indonesia in 2020, there was a serious shortage of medical supplies, which had a detrimental impact on impulsive consumer spending and public safety. This essay aims to comprehend why people make impulsive purchases during catastrophes and disasters such as COVID-19. Using the theories of scarcity and Stimulus, Organism, Response (SOR), this research investigates the impact of the lack of health equipment products on consumers' impulsive buying during the pandemic in Indonesia. In the end, 170 valid data sets from an online poll were obtained, and SmartPLS was used to analyze the data. The results show that impulse purchasing is significantly boosted by shortages. The results also show that while false news on social media moderates the connection between scarcity and impulse purchases, fear of missing out (FOMO) mediates the correlation between scarcity and impulse buying. In order to gain an advantage over competitors in future COVID-19 or similar crisis circumstances, marketers and brand managers will need to develop cutting-edge strategies to increase their brand's market share. The study's results are essential for understanding the abrupt shifts in impulsive buying patterns in Indonesia during an emergency, given the scarcity of health appliance products during the pandemic. This research can therefore contribute to our understanding of customers' irrational purchasing behavior. Businesses and the Indonesian government can take steps to reduce the impact, helping to ensure the country's safety throughout any future epidemic.

Keywords: scarcity, impulsive purchase, fear of missing out, social media fake news, pandemic, COVID-19

JEL Classification: M31

Introduction

The worldwide economy, markets, and public health were all significantly impacted by the coronavirus (COVID-19) outbreak. One of the nations that was significantly impacted by the pandemic is Indonesia. Even though the Indonesian government implemented social distancing and lockdowns to stop the virus's transmission, the numbers of sick and dead constantly rose (Muthiya et al., 2021). This fact proves that coronavirus spreads quickly, resulting in an impact on life's activities (Maliana, 2021). This situation pushed the community into a fairly high state of panic, especially during the beginning of the pandemic (Zhang et al., 2021). Additionally, the public was driven to purchase or stockpile things linked to protecting them against illness, such as face masks, disinfectants, hand sanitizers, and vitamins, as a result of the ongoing hysteria about the COVID-19 phenomenon. During the beginning of the pandemic, stressed-out shoppers were more likely to make impulsive purchases (Widiyarti, 2020).

Impulse purchasing is an unplanned expenditure that is made with little to no planning, primarily out of emotion, and driven by an overwhelming desire to make a purchase (Verplanken & Herabadi, 2001b). Consumer fear might occasionally have led to unexpected buying habits during the COVID-19 epidemic. Consumers' top priorities were to purchase hand sanitizers, masks, and other necessities. Extremely terrified shoppers frequently made impulse purchases. This is a reference to Mehrabian and Russell's S-O-R (stimulus organism responses) model hypothesis (Mehrabian & Russel, 1974; Elisa et al., 2022). The phrase "impulsive purchase" describes extreme fear followed by a purchase. When a consumer buys a lot of something, in case of future shortages, this is referred to as an impulsive purchase (Eva et al., 2021). Impulsive purchasing has also occurred in other countries that have undergone calamities, whether they were natural (Fast et al., 2015; Wai Man Fung & Yuen Loke, 2010) or man-made (Li et al., 2017; Zhao et al., 2018).

When the epidemic first started, the majority of people made impulsive purchases, despite them already having a lot of the products, which caused a shortage of face masks, disinfectant, hand sanitizers, and other medical supplies (Huang & Zhao, 2020). For example, news that "Vitamins and 'Bear Brand' Milk Were Scarce Amid the COVID-19 Surge" (Pinandhita, 2021) caused people to buy them. Milk and vitamins were sought after by people all over Indonesia, due to the widespread popular perception that a range of foods and beverages could kill the COVID-19 virus, or protect people from it (Radiordk, 2021). These rash purchases increased public anxiety and caused supply shortages during the emergency (Elisa et al., 2022). The lack of supplies became a bigger issue because the perception of scarcity played a more significant role than the other factors influencing food hoarding (Nguyen et al., 2022; Patiro et al. 2022).

The two components of impulse buying, according to Verplanken and Herabadi

(2001a), are cognitive and emotive. The lack of thought and planning that went into the purchases is the cognitive aspect. Affective characteristics include emotional inclinations and after-purchase pleasure and joy (Muthiya et al., 2021). There is a strong impulse to spend frequently or obsessively, as well as a sense of immediate satisfaction, regret, and grief after spending money to fulfill one's wishes. One of the unfavorable emotions that the COVID-19 epidemic caused is anxiety (Julianti, 2020).

Supriyanto (2020) argued that people's actions, while buying or making transactions, will be impacted by anxiety. Information disseminated on the internet and through social media during the pandemic increased impulsive purchases (Elisa et al., 2022). Via the internet and social media, people could learn more about COVID-19 and share their stories and events related to COVID-19 (Xiao et al., 2020). According to reports, Indonesia had 202.6 million internet subscribers at the start of 2021 (Riyanto, 2021). With a population of 274.9 million, social media is the most popular online activity among Indonesian internet users. Indonesia is one of the world's most populous nations, in which 170 million people in Indonesia (around 60.1 percent) actively utilize social media (Elisa et al., 2022). They spend an average of 3 hours and 14 minutes on social media sites, and 1 hour and 38 minutes reading news from media outlets (online or in print) (Riyanto, 2021).

Social media serves as a platform demonstrating to consumers the simplicity of accessing information (Mayasari et al., 2023). The majority of Indonesians utilize the internet, or social media, to gather information, but misinformation could be dangerous to the citizens' flow of information (Pradana et al., 2020). There are claims that there were over 850 items of fake news about COVID-19 in Indonesia (Indriani, 2020). The community experienced panic, worry, and uncertainty as a result. The present COVID-19 pandemic offers a chance to examine how scarcity, brought on by highly ambiguous information from the internet or social media, affects Indonesian consumers' impulse purchases. The S-O-R model, which stands for stimulus, organism, and reaction, demonstrates how environmental stimuli can impact an organism's cognition and response to infection (Wu & Li, 2018).

Therefore, this study will identify scarcity through the fear of missing out (FOMO) that affects impulse purchases based on the S-O-R theory and scarcity. This research aims to make a significant theoretical contribution to the existing literature. In emergency and crisis scenarios, like the COVID-19 pandemic, we present empirical evidence for the phenomenon of impulse purchases, which are also offered as a novelty in our research, and as a contribution to the field of consumer behavior. In addition, based on the S-O-R theory, we use FOMO as a mediator to elucidate the psychological process of impulsive purchasing, in order to enhance our understanding of impulsive purchasing during the COVID-19 pandemic. This addition will enrich the emergency management literature, and

expand the application of the stimulus, organism, and reaction theory to impulse purchasing research. During the current COVID-19 pandemic, it can also promote the creation of methods to mitigate the panic and impulsive purchasing produced by social media's fake news. Overall, the research is anticipated to shed new light on how much scarcity influences impulsive purchasing, assist governments in better managing the COVID-19 pandemic, and lessen the worry and impulsive spending brought on by false information spread on social media during the COVID-19 pandemic.

Literature Review

S-O-R Model

Three components make up the S-O-R model, according to Lee and Yun (2015): stimulus, organism, and reaction. In general, stimuli are regarded as being external to people. In most cases, the term "organism" refers to the internal condition brought on by environmental stimuli. The outcome is a response, which might be either an avoidance or an approach activity (Elisa et al., 2022). In another explanation, the S-O-R model is based on the premise that environmental factors have an impact on people's affective (emotional) and cognitive (perceptual) reactions, which have an impact on their behavior (Jiyoung & Lennon, 2013; Lee & Yun, 2015; Y. Wu & Li, 2018).

Impulse purchases are an organism's reaction to stimuli related to a scarcity of health appliances or products, and the many forms of coping mechanisms (fear of missing out) that are discussed in this study. In Maslow's hierarchy of needs, physiological needs are the first and the most fundamental requirements for human survival. Food and water, clothing and shelter, and general health are fundamental physiological requirements that must be met before people may advance to the next stage of fulfillment (Karimah et al., 2021). Safety is also the next lower-level need that must be met. Protection against harm and theft, mental stability and wellbeing, financial security, and the security of one's health are all aspects of safety (Hale et al., 2019). Maslow's two primary basic needs also serve as explanations for why impulse purchasing was really high during the peak of the pandemic (Susanto et al., 2022).

Scarcity on Impulsive purchase

A supply-demand mismatch that results in scarcity leads to a lack of resources (Kristofferson et al., 2017). In marketing, a product is said to be scarce if it is only available temporarily, and in small amounts (Chen et al., 2021). Products have a limited supply, due to unit constraints that the vendor has made known to customers at the start of the offer (Gierl et al., 2008). For the product, consumers must contend with other buyers (Aggarw-

al et al., 2011). An offer that has a specified expiration date is referred to as a limited time offer (Chen et al., 2021). Customers will worry if they don't get the product in time, and will regret exerting all their effort if it is only available for a short period of time (Chiang et al., 2011). As a result, buyers believe that purchasing the goods now is worthwhile (Jang et al., 2015). Due to the increasing demand for health appliances, this study concentrates on their restricted supply.

The coronavirus pandemic psychologically increases our fear of dying. People may become more impulsive while thinking about this condition, which includes making impulsive purchases (Kotler & Keller, 2012). A purchase made on the spur of the moment is known as an impulse buy (Beatty & Elizabeth Ferrell, 1998). Similar to spontaneous desires, the intense need to buy something right away defines impulse buying (Rook, 1987). Stockpiles of necessities, including food and drink, medication, and other necessities, become limited as a result of impulse buying. Consequently, this has an indirect impact on those who don't partake in impulse buying (Harahap et al., 2021). Shou et al. (2011) defined impulsive purchasing as consumer behavior that involves making massive purchases of goods due to upcoming product shortages. The study examined how scarcity may impact these impulsive purchases using a scarcity model created by Wu et al. (2011). The scarcity model is therefore appropriate for our investigation. Therefore, based on the foregoing explanation, the first hypothesis is presented.

H1: Scarcity positively and significantly affects the impulsive purchase of health appliance products in Indonesia.

Fear of Missing out on Impulsive purchase

Higher-order personality traits including fear, neuroticism, impatience, and an inability to regulate oneself will be present in someone who is experiencing FOMO (Balta et al., 2020). The fear of missing out (FOMO) can feel like an intense yearning that lowers one's level of happiness (Abel et al., 2016). Some people are affected by the anxiety-inducing effects of COVID-19 in this scenario. Lockdown restrictions, for some or all of the area, will cause anxious residents to make impulse purchases (Ahmed et al., 2020). As a result, every person reacts differently. They separate themselves from the community and over-purchase staples, even to the point of becoming heavily involved in the procurement of both food and cleaning supplies (Addo et al., 2020).

For the majority of individuals, the act of purchasing is a customary and regular aspect of their everyday lives. Within the realm of the consumer behavior theory, individuals tend to exhibit specific patterns when it comes to making purchases (Negara & Dharmmesta. 2003). Among these behaviors is the phenomenon known as impulse

buying or unplanned purchasing. The terms "impulse" and "unplanned" purchasing have become widely recognized in the spheres of business leadership and marketing academia (Negara & Dharmmesta, 2003). Previous studies have demonstrated that poor planning is a major contributor to impulsive buying. While not all impulsive purchases are unplanned purchases (Kacen et al., 2012; Piron, 1991), unplanned purchases are defined as simply forgetting to buy something that is necessary (Iyer, 1989; Kartawinata et al., 2021), whereas impulse purchases are motivated by an emotion that emerges from irrationality (Amos et al., 2014). Purchasing activity, on the other hand, is seen as unplanned, rapid, and satisfying hedonic behavior. The customer in this case disregards the acceptable advantage that is being presented while thoroughly and logically assessing the available options, due to the haste involved in making this decision, which is a hallmark of an impulse purchase (Park et al., 2012). In addition, FOMO is also associated with an increase in smartphone use in the community (Przybylski et al., 2013). Therefore, the second hypothesis is proposed, based on the above description.

H2: FOMO positively and significantly affects the impulsive purchase of health appliance products in Indonesia.

Scarcity and Fear of Missing out on Impulsive purchase

FOMO can be interpreted as a deep fear that one feels left out of what others may have experienced (Przybylski, et al., 2013). Social FOMO was first described as "a pervasive apprehension that others might be having rewarding experiences from which one is absent" (Elisa et al., 2022). However, Yu et al. (2020) contend that people may experience a similar level of anxiety about losing control over COVID-19-related information. More specifically, the need for people to learn about and keep up with the most recent pandemic information is what fuels COVID-19 information FOMO, since it gives them a sense of informational control (Pradana et al., 2020).

Recent definitions of impulse purchasing vary, but generally speaking, they refer to the spontaneous and direct purchasing of a product without serious analysis of the alternatives and their long-term repercussions (Moon et al., 2017; Pradhan, 2016). Unplanned purchases are another name for impulse purchases (Kalla & Arora, 2011; Ling & Yazdanifard, 2015). The majority of consumers are concerned about missing out on the chance to purchase health appliance items, due to the shortage of health appliance products during the COVID-19 pandemic. This encourages customers to buy them right now. According to Zhang et al. (2021), who examined the impact of perceived shortages on FOMO-mediated alternatives, this viewpoint was supported. Due to scarcity, consumers must decide between purchasing now and passing up the chance to do so (Shi et al., 2020).

FOMO benefits from scarcity (Föbker, 2018; Hodkinson, 2016). Additionally, it was discovered that FOMO affects buying decisions and directly affects impulse purchases (Abel et al., 2016). According to this idea, there may be a link between scarcity, FOMO, and impulse purchasing (Zhang et al., 2021). According to the S-O-R model's point of view, the environment's stimuli impact a person's emotions, which in turn affect that person's conduct (Wu & Li, 2018). Therefore, based on the description above, we propose the third and fourth hypotheses.

H3: Scarcity positively and significantly affects the fear of missing out on health appliance products in Indonesia.

H4: FOMO mediates the relationship between scarcity and the impulsive purchase of health appliance products in Indonesia.

Social Media Fake News as a Moderating Variable on Scarcity's Effect on Impulsive purchase

People restricted their outside activities as a result of the COVID-19 pandemic, in order to reduce their risk of catching the disease. As a result, they used social media to obtain news or information about COVID-19. People now utilize smartphones to access social media platforms like Facebook, WhatsApp, Instagram, and Twitter, in order to stay entertained and get news (Ahmed et al., 2020). As a result, social media are becoming important for facilitating communication between people, and for disseminating information on COVID-19 (Addo et al., 2020). Therefore, false information will impede the effectiveness of the COVID-19 response, and increase people's anxiety and terror during the epidemic (Limaye et al., 2020; Hasbi et al., 2021). As COVID-19 instances increase in Indonesia, false information is being circulated on social media, such as references to certain beverages and foods that can treat COVID-19. Therefore, the WHO call it an "infodemic," which means "the abundance of misinformation, disinformation, and rumors that make it difficult to identify reliable sources of information" (Garrett, 2020).

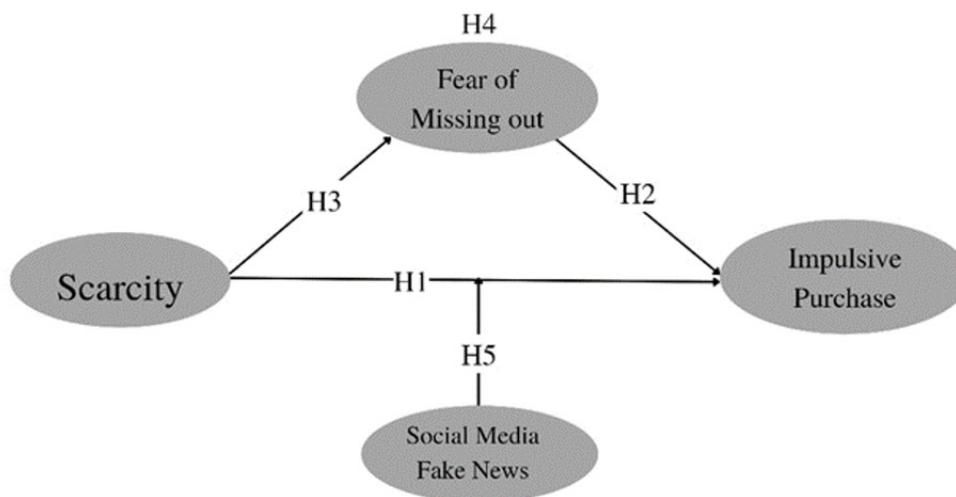
An infodemic has developed concurrently with the fresh COVID-19 pandemic outbreak, with an excessive amount of (correct or inaccurate) information being shared on social media and throughout 24-hour news cycles (Gallotti et al., 2020). Many people have been tempted to closely watch events at any given time, out of anxiety that they may miss out on important (or reassuring) information, especially in light of the individual and societal uncertainties linked to the pandemic (Koffman et al., 2020).

Inaccurate information may have an impact on Indonesian customers' purchasing habits. Large-scale impulsive purchases place an emphasis on seeking solace from the current viral epidemic (Ullah et al., 2022). The majority of customers buy things on impulse, in order to feel secure (Elisa et al., 2022; Arifianti & Gunawan, 2020).

A previous study has explained the strong effect fake news on social media has on impulse purchasing (Ahmed et al., 2020). However, we maintain that fake news on social media is a moderating variable. We feel that fake news on social media might act as a moderating variable considering its effect on impulse purchasing, which affects product scarcity (Di Domenico et al., 2021), but it is not strong enough to produce a strong direct effect on impulse buying (Elisa et al., 2022). Therefore, based on the description above, the fifth hypothesis is proposed.

H5: Fake news on social media moderates the impact of scarcity on the impulsive purchase of health appliance products in Indonesia.

Figure 1. Research Model/Conceptual Framework



Methodology

The study's data were gathered through online questionnaires. In the study, the authors also used convenience sampling, which is a non-probability sampling technique. A total of 170 respondents were contacted through social media and asked to complete a survey questionnaire. The choice of 170 as the sample size was made by the author, based on a number of suggestions from other authors regarding the minimum and recommended number of samples for a study utilizing the structural equation model (SEM) method. Kline, (2016) asserts that 200 respondents should make up the minimal sample size for SEM surveys. Hair et al. (2010) contend that 5 to 10 times the number of indicators utilized in the study should be the proper sample size for the investigation. There were a total

of 17 indicators included in the study for various goods or indicators. Each and every indicator was designed to take into account the respondents' actions at the height of the COVID-19 outbreak in Indonesia. Social media's fake news (three items) from Ahmed et al. (2020), scarcity (four items) from Wu et al. (2011), FOMO (five items) from Zhang et al. (2021), and impulse purchases (five items) from (Ho & Lim, 2018). All the items were rated on a 5-point Likert scale (1 = strongly opposed and 5 = firmly in agreement). Software called Smart PLS was used to evaluate the data gathered from the survey questionnaires. The entire information estimate method, utilizing Smart PLS software, was used for the analysis because SEM is one of the most in-demand approaches by marketing researchers for evaluating new theoretical models with various complex social structures (Wang et al., 2018). PLS-SEM is a tool for more in-depth statistical analysis. It is suitable for estimating intricate models with many constructions (Zhang et al., 2021). With one variable acting as a mediator and one acting as a moderator, for a total of four variables, the current model was complex, making PLS-SEM an appropriate method for this investigation. We also measured the mediating effects by using the Sobel test (Abu-Bader & Jones [2021]). The following section will go over the analysis of the data, and how to interpret the findings.

Table 1. Indicators/Measurement Items

Variable	Indicator	Description
Scarcity	SC1	I think that the supply of health appliance products is only limited during the pandemic
	SC2	I think health appliance products are quickly sold-out during a pandemic
	SC3	I think that many people will buy health appliance products during a pandemic
	SC4	I think the limited supply of health appliance products for each person will cause people to buy a lot of them
Fear of Missing out	FM1	I am anxious about missing the chance to get health appliance products during the pandemic
	FM2	I also buy health appliance products, like other people do, during the pandemic
	FM3	I get worried when others buy health appliance products
	FM4	I fear running out of health appliance products when other people stock-up on them

	FM5	I follow others' shopping patterns for food appliance products
Social Media Fake News	SMFN1	During the COVID-19 phenomenon I have relied on information from social media more
	SMFN2	The social media news provided both misinformation and information during COVID-19
	SMFN3	The fake news on social media has an influential impact that pushed me toward more impulse purchases of essential & non-essential items
Impulsive Purchasing	IP1	I often buy scarce health appliance products spontaneously
	IP2	The way I buy goods is described by the phrase "just do it"
	IP3	I often buy scarce health appliance products without thinking
	IP4	I occasionally feel compelled to purchase health appliance products on the spur of the moment.
	IP5	Sometimes I am a bit reckless about purchasing health appliance products

Results

This study focused on the purchasers of health appliance products in Indonesia. All the data were collected using questionnaires, which were distributed through social media (e.g. WhatsApp, Line, and Instagram) due to the large number of consumers spread across the various regions in Indonesia. The questionnaires were distributed on social media for two weeks (from October 11 to October 24, 2021). The majority of respondents were women (64%), most respondents were aged between 17 and 25 years old (72%), and the vast majority of the respondents were students (67%). In addition, the majority of respondents earned IDR 3,500,000 or less (71%) and many of the respondents considered that health appliance products would be difficult to find during pandemics (58%). A complete analysis of the respondents' profiles is shown in Table 2.

Table 2. Respondents' Profiles

Profil	Criteria	Percentage
Gender	Male	36%
	Female	64%
Age	17-25	72%
	26-35	10%
	36-45	5%
	46-55	9%
	56 over	4%
Occupation	Student	67%
	Entrepreneur	8%
	Government employees	9%
	Other	16%
Income (IDR)	3,500,000 or less	71%
	3,500,001 – 4,500,000	14%
	3,500,001 – 4,500,000	6%
	5,500,000 and above	9%
Health appliance products are scarce	Yes	58%
	No	42%

Measurement Model (Outer Model) Assessment

In order to determine the connection between each variable and obtain the study's findings, the data were processed after the interviewees' profiles had been examined. However, all the data must first satisfy the requirements of validity and reliability in the measurement model's analysis, in order to determine the connection between the factors. The first step in evaluating PLS-SEM results is to test the outer model. To evaluate the relationship between the indicator variables and the related constructs, the measurement model is utilized. It determines the indicators used to establish measurements and directional relationships between the constructs and indicators (Zhang et al., 2021).

We checked the value of the standardized root mean square residual (SRMR) before moving forward with the data analysis, to ensure the model's goodness of fit. Henseler et al. (2015) state that any number higher than 0.08 and less than 0.10 indicates a satisfactory model fit. It was found that the SRMR value was 0.095. The match was good enough to permit further calculations (Hendrayati et al., 2019; Li et al., 2022).

Table 3 shows the results of the reliability tests and the overall validity. All Cronbach's alpha (CA) and composite reliability (CR) values met the expected values, i.e., greater than 0.7, and the value for AVE was above 0.5 (Hair et al., 2012, 2014). Discriminant validity was achieved because the value of AVE on each construct was greater

than the squared correlation between the constructs (Gupta & Gentry, 2019). Thus, we concluded that all the data met the criteria of the measurement model. After the data were considered valid and reliable, an assessment of the structural model (inner model) of the data was made to reveal the existing relationships between the variables. The results of the measurement model's assessment are shown in tables 3 and 4.

Table 3. Measurement Model Analysis

Variables	Indicator/ Items	Factor Loadings	Cronbach's Alpha	Composite Reliability	AVE
FOMO	FM1	0.830	0.872	0.908	0.664
	FM2	0.748			
	FM3	0.919			
	FM4	0.767			
	FM5	0.800			
Impulsive Purchasing	IP1	0.816	0.893	0.921	0.701
	IP2	0.894			
	IP3	0.844			
	IP4	0.853			
	IP5	0.777	0.704	0.807	0.513
Scarcity	SC1	0.816	0.704	0.807	0.513
	SC2	0.717			
	SC3	0.694			
	SC4	0.625			
Social Media Fake News	SMFN1	0.833	0.729	0.844	0.644
	SMFN2	0.747			
	SMFN3	0.825			

Table 4. Discriminant Validity Analysis

	Fear of Missing out	Impulsive Purchasing	Scarcity	Social Media Fake News
Fear of Missing out	0.815			
Impulsive Purchasing	0.565	0.838		
Scarcity	0.371	0.477	0.716	
Social Media Fake News	0.446	0.609	0.448	0.803

Structural Model (Inner Model) Assessment

After the results of the assessment showed a satisfactory measurement model, the next step was to do an assessment on the structural model (Hair et al., 2017). In a structural model, each hypothesis is associated with a causal relationship, and the hypothetical relationship of a structural model is commonly evaluated using a path coefficient (Hair et al., 2017). In principle, the value *t* determines the statistical significance of the coefficient (Hair et al., 2017; Urbach & Ahlemann, 2010). The critical values commonly used in two-sided testing are 1.65 (significance level = 10%), 1.96 (significance level = 5%) and 2.57 (significance level = 1%) (Hair et al., 2017).

Table 5. Path Coefficient

Hypotheses	Path	Path Coefficient	Sample Mean	Standard Deviation	t-values	p-values	Results
H1	Scarcity→Impulsive Purchasing	0.227	0.230	0.102	2.234	0.026	H1 supported (Significant)
H2	FOMO→Impulsive Purchasing	0.311	0.332	0.105	2.971	0.003	H2 supported (Significant)
H3	Scarcity→FOMO	0.371	0.387	0.085	4.346	0.000	H3 supported (Significant)
H4	Scarcity→FOMO→Impulsive Purchasing	0.115	0.128	0.048	2.397	0.017	H3 supported (Significant)
H5	Moderating Effect 1→Impulsive Purchasing	0.104	0.102	0.063	1.674	0.099	H4 supported (Not Significant)

The path coefficients acquired by executing the model's assessment structure were also utilized to examine whether the hypotheses given in this study were supported or rejected. For example, a hypothesis would be supported if the hypothesis's *t*-value (relationship between variables) was greater than the cut-off value of 1.96. In contrast, the hypothesis would be rejected if its *t*-value (relationship between variables) was lower than the cut-off value of 1.96.

In the table above, Scarcity→Impulsive Purchasing obtained a value of significance, which was calculated at $2.234 > 1.96$, with a significance level of $0.026 < 0.05$, and the path coefficient value was positive at 0.227, which suggested that there was a positive and substantial link between shortages and impulse buying. Thus, this research concluded that scarcity had an acknowledged impact on impulse buying. Additionally, favorable associations demonstrated that people were more likely to make impulsive purchases as scarcities rose. The sample in this research was a community of consumers of health appliance products, and there was a strong scarcity connection to their impulse to buy, so it could be applied to the complete population. This makes it crucial to pay attention to how scarce health device goods are.

FOMO→Impulsive Purchasing obtained a significant value in the study, which was t calculated at $2.971 > 1.96$, with a significance level of $0.003 < 0.05$, and the path coefficient value was positive at 0.311 , which suggested that there was a positive and substantial link between FOMO and impulse spending. The research concluded that FOMO had an impact on spontaneous buying. Positive correlations indicated that people were more likely to make rash purchases as FOMO increased. The group in this research was a community of consumers of health equipment products, and given that there was a strong correlation between FOMO and impulsive buying, it could be applied to the entire population as a whole.

Scarcity→FOMO obtained a value of significance of $4.346 > 1.96$, with a significance level of $0.000 < 0.05$, and a path coefficient value of positive 0.371 , which suggested that there was a positive and substantial link between shortages and FOMO. Therefore, this research concluded that shortages had an acknowledged impact on FOMO. Additionally, the favorable association demonstrated that people dreaded missing out on health appliance goods because of the products' scarcity.

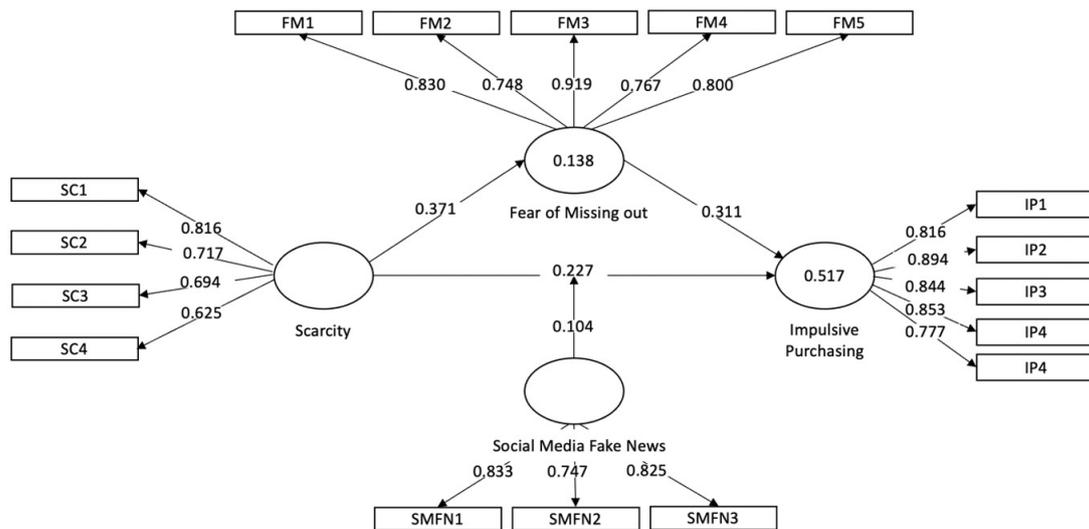
Moderating Effect 1→Impulsive Purchasing obtained a value of significance in the study, namely t calculated at $1.674 < 1.96$, with a significance level of $0.099 > 0.05$, and the path coefficient value of 0.104 , which indicated that the direction of the relationship between Moderating Effect 1 and purchasing impulsiveness was positive, but not significant. This result showed that social media's moderation was influential, but not significant, on the impulsive purchasing of health appliance products.

In addition, the table above shows the mediation effect of FOMO; it demonstrates that the indirect influence of Scarcity→FOMO→Impulsive Purchasing obtained a value in the study, which was t calculated at $2.397 > 1.96$, with a significance level of $0.017 < 0.05$, and the value of the path coefficient was positive at 0.115 , which suggested that there was a positive and substantial connection between shortages and impulse buying, brought on by FOMO. Therefore, this research concluded that scarcity influenced impulsive buying through the accepted dread of losing out. Positive correlations indicated that people were more likely to buy health equipment items spontaneously, as their scarcity rose, but they must first experience the fear of losing out. The path coefficient value of scarcity to FOMO was 0.371 , with a standard error of 0.056 and a significance value of 0.010 , then for the path coefficient of FOMO to impulsive purchasing, a coefficient value of 0.311 was obtained with a standard error of 0.068 , and a significance value of 0.000 . We analyzed the mediating effect by using Sobel's test (Abu-Bader & Jones, 2021). The Sobel test's result was 3.763 , so FOMO had a significant effect as a mediating variable ($3.763 > 1.96$). All these results are visually depicted in Figure 2.

Model Specification and Assessment using PLS-SEM

The partial least squares - structural equation modeling (PLS-SEM) was deployed to assess the research model. This involved two steps (Ringle et al., 2015). First, the measurement model was examined, and then the structural model was assessed. The conceptual framework of this study is depicted in Figure 2.

Figure 2. Assessing the Measurement Model



Discussion

This research examines how the scarcity of health appliance products impacted Indonesian consumers' impulse purchases in response to the COVID-19 epidemic. Due to the partnership between the COVID-19 pandemic and the 2020 infodemic, this public health concern is now more likely to occur (Jahrami et al., 2021). Health experts have issued a warning against extensive reporting because it has been found to have a fatalistic impact on individuals and society (Stainback et al., 2020). International updates regarding COVID-19 are fueling the 24-hour cycle continuously.

According to this study, there may be behavioral (like impulse buying) and motivational (like FOMO) components that become linked when news is consumed during a pandemic or infodemic. This cycle of reciprocity could eventually result in the formation of undesirable behaviors (Shabahang et al., 2021). Unexpectedly, we also found insightful longitudinal data indicating that COVID-19 FOMO can act as a trigger for impulse purchasing. Together, these results suggest that the lockdown's finite energy supplies may be significantly depleted by the rising concern over (information) restrictions. People may get fearful and compete with one another to find a sense of security when inaccurate and

distracting information is being spread in the neighborhood. Impulse buying is one of the key steps to satiating basic requirements, or else wasteful conduct will emerge. Wasteful behavior is defined as impulse purchases made to satisfy wants rather than needs. The advantages of such purchases must be considered before the necessities, and vice versa (Aisa, 2016).

These results suggest that FOMO plays a mediating role in the relationship between scarcity and impulse purchasing. It suggests that the increasing scarcity of health appliance products is raising customers' fear of missing out on these products, causing them to be more impulsive in purchasing them. The S-O-R model, which asserts that environmental stimuli affect an individual's emotions, which in turn drives behavior, is supported by this research (Wu & Li, 2018). Further evidence is provided by Zhang et al. (2020), who contend that FOMO mediates the connection between customers' perceptions of scarcity and their decisions. This discovery sheds light on the role that emotion plays in consumer behavior.

In addition, the study showed that fake news on social media moderated the relationship between the scarcity of health appliance products and impulsive purchases. The effect of scarcity on impulsive purchases by customers is determined by the amount of fake news on social media. Higher levels of fake news lead to impulsive but insignificant purchases. This result is contrary to previous research, which found fake news on social media had a strong and positive impact on impulse buying (Ahmed et al., 2020), especially during a public health crisis. Large quantities of information circulating on social media can lead to information overload and information anxiety, thereby stimulating an individual's impulse buying behavior, due to him/her experiencing uncertainty about COVID-19. It should be noted that there are several things that affect these results. Iliah and Aswad (2022) argue that the factors that influence impulsive purchases consist of many factors, such as gender, internet addiction, hedonic shopping motivation, materialism and promotions. In the end, our findings add innovation by bringing up factors like FOMO and false news on social media as novelties, which also offer contributions to the fields of consumer behavior and business management discussions, aside from psychology or communication science discussions.

Lastly, because impulsive purchases account for the great majority of sales, the study's model suggests that impulsive consumption behavior can successfully promote consumption and mitigate the effects of COVID-19 on economic activity (Zhang et al., 2021). This research can advance the research, by providing managerial and academic insights for governments and marketers after a pandemic, assisting in restoring the national economy, and encouraging consumption and market engagement. With FOMO and product scarcity, consumers become impulsive and are encouraged to continue consuming.

Conclusion

This study examines the impact of scarcity on impulse purchases, with fake news on social media moderating the relationship, and FOMO mediating the relationship between scarcity and impulse purchases. The results showed a significant positive association between scarcity and impulse purchases at the time of the COVID-19 pandemic. Therefore, it can be concluded that the greater the scarcity of health appliance products, the higher will be the tendency for individuals to make impulsive purchases. The lower the scarcity of health appliance products, the lower will be the tendency of individuals to make impulsive purchases.

The results show that impulse purchases are associated with the fear of missing out, especially in the current pandemic conditions. Therefore, every individual needs to understand the spread of the virus, so they understand when to buy an item. Individuals are also expected to reduce their consumption of news that is not guaranteed to be true. After all, this study has identified that scarcity through the fear of missing out (FOMO) affects impulse purchases based on the S-O-R theory and scarcity. However, fake news on social media did not show any essential moderating effect on those variables.

The impact of social media, which disseminate news containing both positive and negative information, will have an effect on impulse purchases. However, based on our results, which did not show a significant effect of social media's fake news, we conclude that a lack of information combined with false or misleading information, spread via social media, will in the end undermine the public's trust. Out of a fear of the unknown, people begin to buy and keep buying. Furthermore, overusing social media and news media will reinforce the sense of panic buying. Therefore, it is crucial that reliable news sources stay away from rumors, and do things that could avert a potential crisis (Naeem, 2021).

The most recent events brought on by the worldwide coronavirus (COVID-19) outbreak made everyone fearful and anxious, and they adopted a protective attitude toward themselves and their families; in order to prevent the outbreak affecting them, they made hasty purchases to satisfy their needs and desires, regardless of the plague that caused impulsive purchases. With the increasing awareness of individuals toward the prevention of COVID-19 infection, the fear that arises will be more easily overcome through various efforts to increase immunity and self-defense, but it is still wise to buy enough goods to meet one's needs. Additionally, the COVID-19 pandemic outbreak caused an unprecedented level of uncertainty in many people, which was only exacerbated by the expanding infodemic. Engagement with positive news is crucial to learning about the pandemic, especially in the early months. This research shows a significant desire to be fully informed about the most recent pandemic-related developments, despite the requirement for this (i.e., COVID-19 FOMO information). It may be a part of a possibly hazardous reinforcing

loop given its connections to FOMO's COVID-19 information. In light of all of these findings, researchers and decision-makers may be alerted to the need to integrate COVID-19's infodemic aftermath in the recent recommendations for a global plan for post-pandemic public health (Reid et al., 2021).

People are expected to filter the news they consume from social media, so as not to be easily influenced and increase their fear of fake news. The public is also encouraged to prevent the spread of the virus by maintaining cleanliness, wearing masks, paying attention to their food intake, and applying social and physical distancing. This can provide a sense of security, minimize the scarcity of health appliance products, and the fear that can lead to other behaviors, one of which is impulse purchasing. Future research may further examine other variables that could be associated with impulse purchases. Future research may also consider other factors that could influence impulsive purchases, and more specific subject characteristics.

Recommendation and Implication

These findings provide some theoretical additions to the body of research on scarcity, impulse buying, FOMO, and fake news on social media. This bolsters the S-O-R model's claim that scarcity influences consumers' impulse purchases. The majority of the earlier research had focused on identifying one theory explaining how scarcity influences impulse purchasing. The results of this study show how emotions and the perception of scarcity interact (FOMO). The study positions bogus news on social media as a moderator between scarcity and impulse buying, adding to the body of information on the effects of this phenomenon.

Additionally, a new model that will precisely reflect the impact of scarcity is being developed, using recent studies on scarcity and impulse purchases. This study dissects the numerous ways that scarcity influences consumers' impulsive purchases, which may aid marketers in better comprehending these effects and creating efficient strategies. Marketing professionals can focus on a variety of mediating processes to reduce the negative effects of scarcity on consumers' purchase intentions (emotions or perceptions).

Our research has several practical implications for media practitioners, policy-makers, and the broader public. Media literacy should be improved, to fight the "infodemic" and halt impulsive buying. This study found a clear, favorable, but not statistically significant relationship between scarcity and social media's fake news, causing impulse buying. Every individual in the internet age needs to develop a certain level of media information literacy, in order to combat false and repetitive information, as well as to reduce the worry and fear caused by information that is not always true. In particular, the general

populace needs to actively cultivate the capacity for knowledge discrimination and critical thought. In order to prevent unnecessary impulse purchases prompted by fear, it is essential to be vigilant and confine the "rumor virus," in addition to having the core knowledge and skills needed for the scientific prevention and control of COVID-19. The Indonesian government may benefit greatly, in many different ways, from this research. It will give people more influence over the market before a disaster and aid in maintaining order in society.

By reducing people's fear of missing out, limiting the number of health appliance goods depending on population size, or utilizing PR tactics to reduce people's fear of missing out, the government may, for instance, aim to prevent people from making impulsive purchases. These strategies might lessen impulsive consumer spending, which will help the government keep the peace. This result can aid in the understanding of how scarcity can be utilized as a marketing strategy to persuade consumers to purchase items they do not require, which can aid people in maintaining emotional control and preventing illogical purchases. Given that uncommon items are typically more expensive, it can also enable customers to spend more wisely (Lim, 2015; van Herpen et al., 2009).

Limitation

Research Limitations and Suggestion for Future Research

Regarding the study's limitations, although 170 validity surveys were gathered in Indonesia, the procedure was time-constrained. Because Indonesia has a large population, the response cannot encompass all the consumer views within Indonesia. Second, "organism" in the SOR paradigm stands for emotional and cognitive processes. The research, however, concentrates on the (affective) dread of losing out as a mediator. Third, the study was cross-sectional in nature. A cross-sectional research design can be thought of as a correlational term at most. Hence, there are only a few possible causative conclusions that can be drawn from the results. Extrapolation of the results outside the goods examined should be done with greater care in any future research, because the findings of this study are only directly relevant to one particular product group. Researchers may decide to look at scarcity and impulse buying in other sectors, or with regard to products that are becoming uncommon as a result of customers' fear purchases in the context of COVID-19. Finally, even though the sample size was sufficient to yield pertinent findings, it could be expanded, probably by including other regions of Indonesia, to provide a more comprehensive comparative study across the entire country. This result could be taken into account as a component of a broader comparison study of Indonesia. Furthermore, comparative studies between nations, or periods within the same country, are feasible due

to the variety of COVID-19 conditions and societies in different countries. To improve the model's breadth and explanatory power, a future study may also include novel structures related to the effects of scarcity.

References

- Abel, J. P., Buff, C. L., & Burr, S. A. (2016). Social Media and the Fear of Missing Out: Scale Development and Assessment. *Journal of Business & Economics Research*, 14(1), 33–44.
- Abu-Bader, S., & Jones, T. V. (2021). Statistical mediation analysis using the sobel test and hayes SPSS process macro. *International Journal of Quantitative and Qualitative Research Methods*.
- Addo, P. C., Jiaming, F., Kulbo, N. B., & Liangqiang, L. (2020). COVID-19: Fear appeal favoring purchase behavior towards personal protective equipment. *The Service Industries Journal*, 40(7–8), 471–490. <https://doi.org/10.1080/02642069.2020.1751823>
- Aggarwal, P., Jun, S. Y., & Huh, J. H. (2011). SCARCITY MESSAGES. *Journal of Advertising*, 40(3), 19–30. <https://doi.org/10.2753/JOA0091-3367400302>
- Ahmed, R. R., Streimikiene, D., Rolle, J.-A., & Pham, A. D. (2020). The COVID-19 pandemic and the antecedents for the impulse buying behavior of US citizens. *Journal of Competitiveness*, 12(3), 5.
- Aisa, S. (2016). Orientasi Tujuan Penguasaan dan Atribusi Usaha sebagai Prediktor Prestasi Belajar Matematika (Doctoral dissertation, Universitas Gadjah Mada).
- Amos, C., Holmes, G. R., & Keneson, W. C. (2014). A meta-analysis of consumer impulse buying. *Journal of Retailing and Consumer Services*, 21(2), 86–97.
- Arifianti, R., & Gunawan, W. (2020). PERILAKU IMPULSE BUYING DAN INTERAKSI SOSIAL DALAM PEMBELIAN DI MASA PANDEMI. *Jurnal Pemikiran Dan Penelitian Sosiologi*, 5(1).
- Balta, S., Emirtekin, E., Kircaburun, K., & Griffiths, M. D. (2020). Neuroticism, Trait Fear of Missing Out, and Phubbing: The Mediating Role of State Fear of Missing Out and Problematic Instagram Use. *International Journal of Mental Health and Addiction*, 18, 628–639. <https://doi.org/10.1007/s11469-018-9959-8>
- Beatty, S. E., & Elizabeth Ferrell, M. (1998). Impulse buying: Modeling its precursors. *Journal of Retailing*, 74(2), 161–167. [https://doi.org/10.1016/S0022-4359\(98\)90009-4](https://doi.org/10.1016/S0022-4359(98)90009-4)
- Chen, T., Yeh, T., & Wang, Y. (2021). The drivers of desirability in scarcity marketing. *Asia Pacific Journal of Marketing and Logistics*, 33, 924–944. <https://doi.org/10.1108/APJML-03-2020-0187>
-

- Chiang, C., Chiun-shin, Lin., & Chin, S.-P. (2011). Optimizing time limits for maximum sales response in Internet shopping promotions. *Expert Systems with Applications*, 38(1), 520–526. <https://doi.org/10.1016/j.eswa.2010.06.094>
- Di Domenico, G., Sit, J., Ishizaka, A., & Nunan, D. (2021). Fake news, social media and marketing: A systematic review. *Journal of Business Research*, 124, 329-341.
- Elisa, H. P., Fakhri, M., & Pradana, M. (2022). The moderating effect of social media use in impulsive purchase of personal protective equipments during the COVID-19 pandemic. *Cogent Social Sciences*, 8(1), 2062094.
- Eva, N., Saputra, D. R., Wulandari, D. A., Yahya, F. A., & Annisa, W. (2021). Panic-Buying Behaviour During the Covid-19 Outbreak: A Cross-Cultural Psychological Study. *KnE Social Sciences*. <https://doi.org/10.18502/kss.v4i15.8192>
- Fast, S. M., González, M. C., Wilson, J. M., & Markuzon, N. (2015). Modelling the propagation of social response during a disease outbreak. *Journal of The Royal Society Interface*, 12(104), 20141105. <https://doi.org/10.1098/rsif.2014.1105>
- Föbker, N. (2018). *Can You Resist? The Influence of Limited-Time Scarcity and Limited-Supply Scarcity on Females and Males in Hotel Booking Apps*. University of Twente.
- Gallotti, R., Valle, F., Castaldo, N., Sacco, P., & De Domenico, M. (2020). Assessing the risks of ‘infodemics’ in response to COVID-19 epidemics. *Nature Human Behaviour*, 4(12), Article 12. <https://doi.org/10.1038/s41562-020-00994-6>
- Garrett, L. (2020). COVID-19: The medium is the message. *The Lancet*. [https://doi.org/10.1016/S0140-6736\(20\)30600-0](https://doi.org/10.1016/S0140-6736(20)30600-0)
- Gierl, H., Plantsch, M., & Schweidler, J. (2008). Scarcity effects on sales volume in retail. *The International Review of Retail, Distribution and Consumer Research*, 18(1), 45–61. <https://doi.org/10.1080/09593960701778077>
- Gupta, S., & Gentry, J. W. (2019). ‘Should I Buy, Hoard, or Hide?’ - Consumers’ responses to perceived scarcity. *The International Review of Retail, Distribution and Consumer Research*, 29, 178–197. <https://doi.org/10.1080/09593969.2018.1562955>
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate Data Analysis: Seventh Edition*. Prentice Hall.
- Hair, J. F., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2017). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)* (2nd ed.). SAGE.
- Hair, J. F., Sarstedt, M., Hopkins, L., & Kuppelwieser, V. G. (2014). Partial Least Squares Structural Equation Modelling (PLS-SEM) an emerging tool in business research. *European Business Review*, 26(2), 106–121. <https://doi.org/10.1108/EBR-10-2013-0128>
- Hair, J. F., Sarstedt, M., Ringle, C. M., & Mena, J. A. (2012). An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal*

- of the Academy of Marketing Science*, 40, 414–433. <https://doi.org/10.1007/s11747-011-0261-6>
- Hale, A. J., Ricotta, D. N., Freed, J., Smith, C. C., & Huang, G. C. (2019). Adapting Maslow's hierarchy of needs as a framework for resident wellness. *Teaching and learning in medicine*, 31(1), 109-118.
- Harahap, D. A., Ferine, K. F., Irawati, N., Nurlaila, N., & Amanah, D. (2021). Emerging Advances In E-Commerce: Panic And Impulse Buying During The Covid-19 Pandemic. <http://repository.unisba.ac.id:8080/xmlui/handle/123456789/29974>
- Hasbi, I., Pradana, M., Wijaksana, T. I., Reshanggono, A. S., & Arwiyah, M. Y. (2021). Digital marketing, functional and hedonic quality effects on perceived value of Indonesian shopping center. *Journal of Management Information and Decision Sciences*, 24(6), 1-8.
- Hendrayati, H., Atrisia, M. I., & Disman, S. (2019). The Innovation of Digital Dockless Bike-Sharing for City's Air Quality as Sustainable Transportation. *Journal of Engineering Science and Technology*, 2019, 14(2), pp. 557–568.
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the academy of marketing science*, 43, 115-135.
- Ho, S. Y., & Lim, K. H. (2018). Nudging Moods to Induce Unplanned Purchases in Imperfect Mobile Personalization Contexts. *MIS Quarterly*, 42(3), 757–778. <https://doi.org/10.25300/MISQ/2018/14083>
- Hodkinson, C. (2016). 'Fear of Missing Out' (FOMO) marketing appeals: A conceptual model. *Journal of Marketing Communications*, 1–24. <https://doi.org/10.1080/13527266.2016.1234504>
- Huang, Y., & Zhao, N. (2020). Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: A web-based cross-sectional survey. *Psychiatry Research*, 288, 112954. <https://doi.org/10.1016/j.psychres.2020.112954>.
- Iliah, L. R., & Aswad, M. (2022). Faktor-Faktor Yang Mempengaruhi Pembelian Impulsif Secara Online Pada Masyarakat Kabupaten Kediri. *J-CEKI: Jurnal Cendekia Ilmiah*, 1(3), 209–224.
- Indriani. (2020, July 10). Kominfo: Hingga Juni terdapat 850 hoaks terkait COVID-19. Kominfo.
- Iyer, E. S. (1989). Unplanned Purchasing: Knowledge of shopping environment and. *Journal of Retailing*, 65(1), 40.
- Jahrami, H., BaHamam, A. S., Bragazzi, N. L., Saif, Z., Faris, M., & Vitiello, M. V. (2021). Sleep problems during the COVID-19 pandemic by population: A systematic re-

- view and meta-analysis. *Journal of Clinical Sleep Medicine*, 17(2), 299–313. <https://doi.org/10.5664/jcsm.8930>
- Jang, W., Ko, Y. J., Morris, J. D., & Chang, Y. (2015). Scarcity Message Effects on Consumption Behavior: Limited Edition Product Considerations. *Psychology & Marketing*, 32(10), 989–1001. <https://doi.org/10.1002/mar.20836>
- Jiyoung, Kim., & Lennon, S. J. (2013). Effects of reputation and website quality on online consumers' emotion, perceived risk and purchase intention. *Journal of Research in Interactive*, 7(1), 33–56. <https://doi.org/10.1108/1750593131131>
- Julianti, A. (2020). KECEMASAN DAN PEMBELIAN IMPULSIF PADA SAAT PANDEMI COVID-19. *UG JURNAL*, 14.
- Kacen, J. J., Hess, J. D., & Walker, D. (2012). Spontaneous selection: The influence of product and retailing factors on consumer impulse purchases. *Journal of Retailing and Consumer Services*, 19(6), 578–588.
- Kalla, S. M., & Arora, A. p. (2011). Impulse Buying: A Literature Review. *Global Business Review*, 12, 145. <https://doi.org/10.1177/097215091001200109>
- Karimah, F. S., Fakhri, M., & Pradana, M. (2021). Social Influence and Online Trust in Online Shopping Behavior: Evidence from Indonesia. *Journal of Positive Psychology and Wellbeing*, 5(3), 1339-1348.
- Kartawinata, B. R., Fakhri, M., Pradana, M., Hanifan, N. F., & Akbar, A. (2021). The role of financial self-efficacy: Mediating effects of financial literacy & financial inclusion of students in West Java, Indonesia. *Journal of Management Information and Decision Sciences*, 24(7), 1-9.
- Kline, R. B. (2016). *Principles and Practice of Structural Equation Modeling Fourth Edition (4th Editio)*. Guilford Press.
- Koffman, J., Gross, J., Etkind, S. N., & Selman, L. (2020). Uncertainty and COVID-19: How are we to respond? *Journal of the Royal Society of Medicine*, 113(6), 211–216. <https://doi.org/10.1177/0141076820930665>
- Kotler, P., & Keller, K. L. (2012). *Marketing management (14th [ed.]*). Prentice Hall.
- Kristofferson, K., McFerran, B., Morales, A., & Dahl, D. (2017). The Dark Side of Scarcity Promotions: How Exposure to Limited-Quantity Promotions Can Induce Aggression. *Consumer Research*, 43(5), 683–706. <https://doi.org/10.1093/jcr/ucw056>
- Lee, H.-J., & Yun, Z.-S. (2015). Consumers' perceptions of organic food attributes and cognitive and affective attitudes as determinants of their purchase intentions toward organic food. *Food Quality and Preference*, 39, 259–267. <https://doi.org/10.1016/j.foodqual.2014.06.002>
- Li, J., Manafian, J., Wardhana, A., Othman, A. J., Husein, I., Al-Thamir, M., & Abotaleb, M. (2022). N-lump to the (2+ 1)-dimensional variable-coefficient Caudrey–Dodd–

- Gibbon–Kotera–Sawada equation. *Complexity*, 2022.
- Li, X., Wang, Z., Gao, C., & Shi, L. (2017). Reasoning human emotional responses from large-scale social and public media. *Applied Mathematics and Computation*, 310, 182–193. <https://doi.org/10.1016/j.amc.2017.03.031>
- Lim, P. L. (2015). What Internal and External Factors influence Impulsive purchase Behavior in Online Shopping? *Global Journal of Management and Business Research*, 15(5), 25–32.
- Limaye, R. J., Sauer, M., Ali, J., Berstein, J., Wahl, B., Barnhill, A., & Labrique, A. (2020). Building trust while influencing online COVID-19 content in the social media world. *The Lancet Digital Health*. [https://doi.org/10.1016/s2589-7500\(20\)30084-4](https://doi.org/10.1016/s2589-7500(20)30084-4)
- Ling, L. P., & Yazdanifard, R. (2015). What Internal and External Factors Influence Impulsive purchase Behavior in online Shopping? *Global Journal of Management and Business Research: EMarketing*, 15(5), 25–32.
- Maliana, I. (2021, September). BREAKING NEWS Corona 30 September 2021: Kasus Positif Bertambah 1.690, Sembuh 2.848, Meninggal 113. *TribunNews*.
- Mayasari, I., Haryanto, H. C., Hutagaol, O. D., Ramadhan, A. R., & Amir, I. (2023). Examining the Role of Social Media Marketing on Brand Love and Its Impact on Brand Centrality: The Study of Local Fashion Brands for the Millennials. *Journal of Indonesian Economy and Business*, 38(2), 147-165.
- Mehrabian, A., & Russell, J. A. (1974). A verbal measure of information rate for studies in environmental psychology. *Environment and Behavior*, 6(2), 233.
- Moon, M. A., Farooq, A., & Kiran, M. (2017). Social Shopping Motivations of Impulsive and Compulsive Buying Behaviors. *UW Journal of Management Sciences* 1, 15–27.
- Muthiya, A. I., Pradana, M., Wijaksana, T. I., Utami, F. N., & Artadita, S. (2021). Self-monitoring and Trust as Essential Factors on Impulsive Purchase of Hand Sanitizer Products in Indonesian COVID-19 Situation. *Webology*, 18(2).
- Naeem, M. (2021). Do social media platforms develop consumer impulsive purchase during the fear of Covid-19 pandemic. *Journal of Retailing and Consumer Services*, 58, 102226. <https://doi.org/10.1016/j.jretconser.2020.102226>
- Negara, D. J., & Dharmmesta, B. S. (2003). Normative Moderators Of Impulse Buying Behaviour. *Gadjah Mada International Journal of Business*, 5(1), 1-14.
- Nguyen, N., Nguyen, C., Khuu, P., & Nguyen, K. (2022). Panic purchasing: Food hoarding in a city under lockdown during the COVID-19 pandemic. *Gadjah Mada International Journal of Business*, 24(3), 310-323.
- Park, E. J., Kim, E. Y., Funches, V. M., & Foxx, W. (2012). Apparel product attributes, web browsing, and e-impulse buying on shopping websites. *Journal of Business Research*, 65(11), 1583–1589.
- Patiro, S. P. S., Budiayanti, H., & Hendarto, K. A. H. (2022). Panic-buying behavior during

- the Covid-19 Pandemic in Indonesia: A social cognitive theoretical model. *Gadjah Mada International Journal of Business*, 24(1), 25-55.
- Pinandhita, V. (2021). Vitamin dan “Susu Beruang” Jadi Buruan di Tengah Lonjakan COVID-19. Detikhealth.
- Piron, F. (1991). Defining impulse purchasing. *ACR North American Advances*.
- Pradana, M., Syahputra, S., Wardhana, A., Kartawinata, B. R., & Wijayangka, C. (2020). The effects of Incriminating COVID-19 news on the Returning Indonesians’ anxiety. *Journal of Loss and Trauma*, 25(8), 656-661.
- Pradhan, V. (2016). Study on Impulsive purchase Behavior among Consumers in Supermarket in Kathmandu Valley. *Journal of Business and Social Sciences Research*, 1(2), 215–233. <https://doi.org/10.3126/jbssr.v1i2.20926>
- Przybylski, A. K., Murayama, K., Dehaan, C. R., & Gladwell, V. (2013). Motivational, emotional, and behavioral correlates of fear of missing out. *Computers in Human Behavior*, 29(4), 1841–1848. <https://doi.org/10.1016/J.CHB.2013.02.014>
- Radiordk. (2021, July 7). Covid-19 Melonjak, Masyarakat Dilanda Impulsive purchase Susu Beruang.
- Reid, M., Abdool-Karim, Q., Geng, E., & Goosby, E. (2021). How will COVID-19 transform global health post-pandemic? Defining research and investment opportunities and priorities. *PLOS Medicine*, 18(3), e1003564. <https://doi.org/10.1371/journal.pmed.1003564>
- Riyanto, G. (2021, February 23). Jumlah Pengguna Internet Indonesia 2021 Tembus 202 Juta. Kompas.Com.
- Rook, D. W. (1987). The Buying Impulse. *Journal of Consumer Research*, 14(2), 189. <https://doi.org/10.1086/209105>
- Shabahang, R., Arugute, M. S., & Shim, H. (2021). Online News Addiction: Future Anxiety, Fear of Missing Out on News, and Interpersonal Trust Contribute to Excessive Online News Consumption. *Online Journal of Communication and Media Technologies*, 11(2), e202105. <https://doi.org/10.30935/ojcm/10822>
- Shi, X., Li, F., & Chumnumpan, P. (2020). The use of product scarcity in marketing. *European Journal of Marketing*, 54(2), 380–418. <https://doi.org/10.1108/EJM-04-2018-0285>
- Shou, B., Xiong, H., & Shen, Z. M. (2011). Consumer panic buying and fixed quota policy. *Technical Report, Working Paper*, 1-38.
- Stainback, K., Hearne, B. N., & Trieu, M. M. (2020). COVID-19 and the 24/7 News Cycle: Does COVID-19 News Exposure Affect Mental Health? *Socius: Sociological Research for a Dynamic World*, 6, 237802312096933. <https://doi.org/10.1177/2378023120969339>

- Supriyanto, Y. (2020, March 31). Kecemasan Virus Corona Meningkatkan Belanja Online. *Bisnis.Com*.
- Susanto, E., Hendrayati, H., Rahtomo, R. W., & Prawira, M. F. A. (2022). Adoption of Digital Payments for Travelers at Tourism Destinations. *African Journal of Hospitality, Tourism and Leisure*, 11(2), 741-53.
- Ullah, Sabeeh, Shahzad Hussain, Budi Rustandi Kartawinata, Zia Muhammad, and Rosa Fitriana. "Empirical nexus between Chinese investment under China–Pakistan Economic Corridor and economic growth: An ARDL approach." *Cogent Business & Management* 9, no. 1 (2022): 2032911.
- Urbach, N., & Ahlemann, F. (2010). Structural equation modeling in information systems research using Partial Least Squares. *Journal of Information Technology Theory and Application*, 11, 5–40.
- Van Herpen, E., Pieters, R., & Zeelenberg, M. (2009). When demand accelerates demand: Trailing the bandwagon. *Journal of Consumer Psychology*, 19(3), 302–312. <https://doi.org/10.1016/j.jcps.2009.01.001>
- Verplanken, B., & Herabadi, A. (2001a). Individual differences in impulse buying tendency: Feeling and no thinking. *European Journal of Personality*, 15, S71–S83. <https://doi.org/10.1002/per.423>
- Verplanken, B., & Herabadi, A. (2001b). Individual differences in impulse buying tendency: Feeling and no thinking. *European Journal of Personality*, 15(1_suppl), S71–S83. <https://doi.org/10.1002/per.423>
- Wai Man Fung, O., & Yuen Loke, A. (2010). Disaster preparedness of families with young children in Hong Kong. *Scandinavian Journal of Public Health*, 38(8), 880–888. <https://doi.org/10.1177/1403494810382477>
- Wang, S., Wang, J., Li, J., Wang, J., & Liang, L. (2018). Policy implications for promoting the adoption of electric vehicles: Do consumer's knowledge, perceived risk and financial incentive policy matter? *Transportation Research Part A: Policy and Practice*, 117, 58–69. <https://doi.org/10.1016/J.TRA.2018.08.014>
- Widiyarti, Y. (2020, April). Belanja Impulsif, Pelarian dari Kecemasan pada COVID-19. *Tempo.Co*.
- Wu, W.-Y., Lu, H.-Y., Wu, Y.-Y., & Fu, C.-S. (2011). The effects of product scarcity and consumers' need for uniqueness on purchase intention. *International Journal of Consumer Studies*, 36(3), 263–274. <https://doi.org/10.1111/j.1470-6431.2011.01000.x>
- Wu, Y., & Li, E. (2018). Marketing mix, customer value, and customer loyalty in social commerce. *Internet Research*, 28(1), 74–104. <https://doi.org/10.1108/IntR-08-2016-0250>
- Wu, Y.-L., & Li, E. Y. (2018). Marketing mix, customer value, and customer loyalty in social commerce: A stimulus-organism-response perspective. *Internet Research*,
-

- 28(1), 74–104. <https://doi.org/10.1108/IntR-08-2016-0250>
- Xiao, H., Zhang, Z., & Zhang, L. (2020). A diary study of impulsive purchase during the COVID-19 pandemic. *Current Psychology*. <https://doi.org/10.1007/s12144-020-01220-2>
- Yu, S.-C., Chen, H.-R., Liu, A.-C., & Lee, H.-Y. (2020). Toward COVID-19 Information: Infodemic or Fear of Missing Out? *Healthcare*, 8(4), Article 4. <https://doi.org/10.3390/healthcare8040550>
- Zhang, J., Jiang, N., Turner, J. J., & Sharif, S. P. (2021). The Impact of Scarcity of Medical Protective Products on Chinese Consumers' Impulsive Purchasing during the COVID-19 Epidemic in China. *Sustainability*, 13, 9749. <https://doi.org/10.3390/su13179749>
- Zhao, Y., Kou, G., Peng, Y., & Chen, Y. (2018). Understanding influence power of opinion leaders in e-commerce networks: An opinion dynamics theory perspective. *Information Sciences*, 426, 131–147. <https://doi.org/10.1016/j.ins.2017.10.031>

Work is Fun, isn't it? Bibliometrics of Fun Work

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Abstract: The attention and interest in fun work have exponentially increased among practitioners and academic communities. This phenomenon replaced the old-fashioned view that created a rigid climate in the office. Many employees have adopted a fun work culture to improve employer branding and employee experiences and retain their talents. Using bibliometric techniques, this study aimed to capture the trend of research in fun work and identify research streams in fun work derived from the critical topic distributions of the fun work academic literature. We performed word co-occurrence analysis, author network analysis, and publication analysis. This study identified four streams in the science of fun work: activities to make work fun, a fun work environment system, positive effects of fun work, and support for fun work. The research trend and research streams in Fun Work provided insight for researchers to find potential issues to address in future research. They revealed the interactions as well as connections among researchers in fun work.

Keywords: fun work, fun at work, bibliometric study

JEL Classification: L20, L22, D23

Introduction

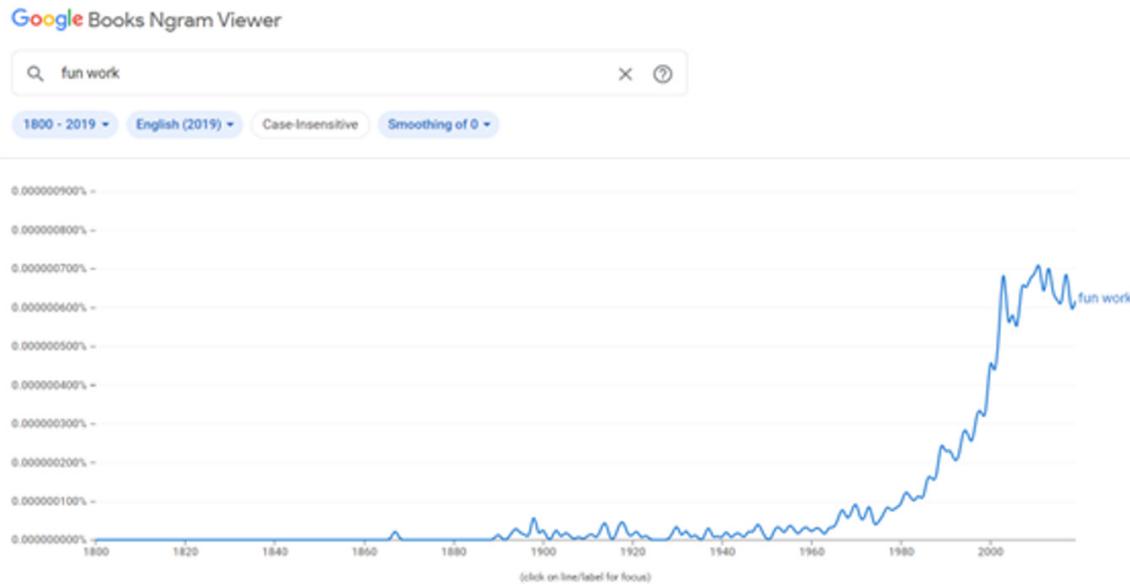
During the industrial era, clear boundaries existed between work and nonwork activities. Work and leisure time were kept separated, and the idea of mixing the two was discouraged (Fleming & Spicer, 2004). Beynon (1980, as cited in Fleming & Spicer, 2004) expressed this perspective by stating that work and play should be kept distinct, with play only allowed after work. Work was primarily associated with labor and toil, and the notion of fun was seen as contradictory to the purpose of work (Plester, Cooper-Thomas, & Winquist, 2015).

In contrast, the post-industrial era brought a significant shift in organizational culture. Companies started embracing a more flexible, adaptive, and empowering approach to work (Fleming & Spicer, 2004). This transformation led to the blurring of boundaries between work and personal life, also between formal organizational settings and the home. A vital aspect of this evolving culture was the integration of playfulness and fun into the work environment. Deal and Kennedy (1982) emphasized the importance of incorporating fun, playfulness, and humor into the workplace as employees began to expect these elements. They suggested that management should actively embrace and foster a sense of joy within their organizations.

Two notable examples of organizations implementing fun elements in their culture were J. W. Marriott and Google. J. W. Marriott believed in creating a hard-working yet enjoyable environment for employees, emphasizing the need to teach, care for, and incorporate fun (Collins & Porras, 2005). Conversely, Google focused on building a positive working environment, meaningful work, and employee freedom. They adopted the belief that "fun comes from everywhere" (Schmidt & Rosenberg, 2014). Google incorporated fun into various aspects of work, such as celebrating April Fool's Day, allowing employees to engage in recreational activities during breaks, incorporating fun into office design, and encouraging employees to spend 20% of their work week on self-assigned projects (Meek, 2015).

Fleming (2005) described this shift as a fun culture emphasizing the importance of having fun at work. Ford, McLaughlin, and Newstrom (2003) defined fun work as an environment intentionally designed to encourage enjoyable and pleasurable activities that positively impact individuals' and groups' attitudes and productivity. This fun culture replaced the traditional view of work as a strictly serious endeavor, granting freedom for play and humor in the office (Fleming, 2005).

The concept of fun work gained attention in management literature, particularly in the context of corporate culture. It has steadily grown as a topic of interest in academic and practitioner literature over the past three decades (Owler, Morrison, & Plester, 2010). A keyword search using the Google Books Ngram Viewer revealed a significant rise in the use of the term "fun work" from the late 1970s until 2019 (figure 1).

Figure 1. Google's Book Ngram Viewer for fun work.

Numerous researchers have investigated fun work in different contexts, revealing positive organizational impacts. Studies have shown that fun at work can increase applicant attraction (Tews, Michel, & Bartlett, 2012), reduce turnover intention (Karl, Peluchette, & Hall, 2008; McDowell, 2004), and enhance employee engagement and retention (Tsaor, Hsu, & Lin, 2019; Chan, 2019; Djastuti, Rahardjo, Irviana, & Udin, 2019).

Despite the increasing popularity and evolving nature of research on fun work, it is still considered a relatively new topic in organizational studies. Further exploration is needed to understand the concept, its antecedents, the positive and negative impacts of fun at work, and related issues. Therefore, this paper aims to employ bibliometric analysis methods to examine the research trend in fun work and identify the distribution of crucial topics within academic literature.

Literature Review

The "Fun Work" movement emerged from the influential books written by Deal & Kennedy (1982) and Peters & Waterman (1982), which encouraged managers to cultivate a corporate culture that embraces playful, enjoyable, and humorous experiences (Owler, Morrison, & Plester, 2010; Tews, Michel, & Bartlett, 2012). This shift towards a culture of fun challenged the conventional belief that work should solely be serious and devoid of enjoyment (Owler, Morrison, & Plester, 2010).

Scholars have explored the concept of fun work using various terms such as workplace fun, fun environment, fun at work, fun culture, and fun work. Lamm & Meek (2009)

referred to it as workplace fun, encompassing activities that provide amusement, enjoyment, and pleasure, whether social, interpersonal, recreational, or task-oriented. On the other hand, Ford, McLaughlin, & Newstrom (2003) described it as a fun environment where a wide range of enjoyable and pleasurable activities are intentionally encouraged, initiated, and supported to positively impact the attitudes and productivity of individuals and groups. Despite these terminological differences, both Lamm and Meek (2009) and Ford, McLaughlin, and Newstrom (2003) shared a core similarity, considering anything that fosters enjoyment in the workplace as part of the fun work concept. For this article, the term "fun work" will be used as a more general term to encompass the culture, environment, activities, and initiatives promoting workplace enjoyment.

Understanding fun work extends beyond conceptualization. Plester, Cooper-Thomas, and Winquist (2015) contributed to a deeper comprehension of the concept by identifying three categories of fun work: organic fun, managed fun, and task fun. Organic fun occurs naturally and spontaneously through interactions among organizational members. Managed fun comprises activities and initiatives organized by management to achieve business objectives. Task fun refers to the enjoyment experienced by employees while performing their job tasks.

As the popularity of fun work grew in business and academic literature, researchers explored its various contexts and purposes, including investigating its consequences. The accumulating body of literature has demonstrated the positive impact of fun work on organizations (Tews, Michel, & Bartlett, 2012). Ford et al. (2003) explained that implementing fun work influences individual and group attitudes and productivity. Consistent with their findings, fun work had also been associated with better job performance (Tews, Michel, & Stafford, 2013). Tews et al. (2012) found that fun in the workplace has a favorable influence on applicant attraction, suggesting that infusing fun into work can be a strategy to enhance recruitment attractiveness and talent retention (Karl, Peluchette, & Hall, 2008).

Despite the proven potential benefits of fun work documented by numerous studies, it is also met with negative perceptions from top management and employees (Michel, Tews & Allen, 2018). Some managers express skepticism towards fun work, believing it may blur the boundaries between work and play (Fleming, 2005). Additionally, the subjective nature of what constitutes "fun" can lead to differing interpretations and attitudes among individuals (Plester, Cooper-Thomas, & Winquist, 2015). Interview participants have shown cynicism and resistance towards activities arranged by their organization, contrasting with their more positive views of organic fun. Workplace humor can be perceived as harmful or making fun of someone, creating negative implications (Georganta & Montgomery, 2018). Furthermore, when faced with increased workloads, some employees may view fun activities as annoying.

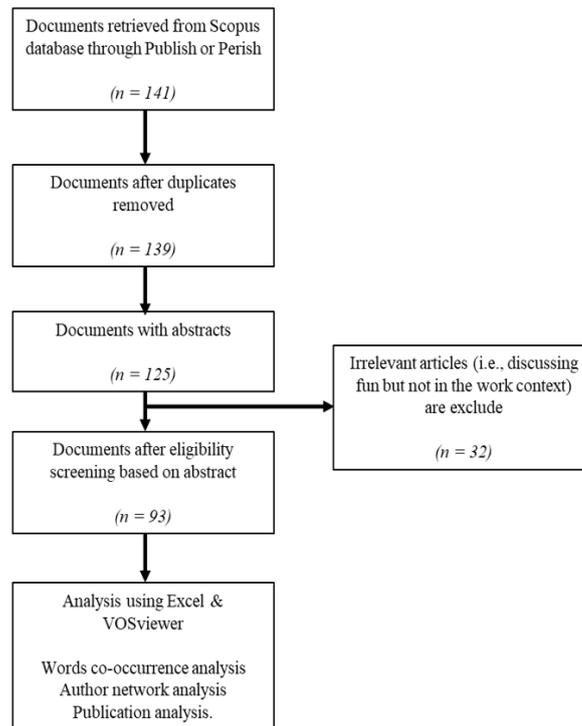
Methods

This study employed a bibliographic approach to examine the research trend in fun work and identify the distribution of critical topics within academic literature. This study included a bibliometric analysis of publication analysis, author network analysis, and network of words co-occurrence analysis. Bibliographic research enables researchers to investigate the spread and impact of knowledge within a specific area of interest. Its primary objective is to quantify the influence of individuals, publications, or journals on a scientific field's overall development and structure (Kraus, Filser, Eggers, Hills, & Hultman, 2012). Bibliometrics is a quantitative and literature-based analysis that uses statistical methods to analyze the interrelationship of publications and articles. Ferreira (2018) explained that bibliometrics is a monitoring approach to developing a research topic by organizing the basic information, such as citations, authors, co-authors, journals, and keywords. The bibliometric analysis method is excellent in handling many articles to build up research topics, identify areas of interest, researcher interaction, and internal relations explanation (Van Eck & Waltman, 2010; Zupic & Cater, 2014; Vogel & Guttel, 2013). Unlike a traditional systematic literature review, this method also significantly reduces the researcher's bias, effort, and time (Radhakrishnan, Erbis, Isaacs, & Kamarthi, 2017).

Data Search Strategy

One hundred forty-one documents were successfully retrieved from the Scopus database through Publish or Perish software version 7 (Adams, 2019) using specific keywords ("fun work" OR "fun working" OR "fun workplace" OR "fun at work" OR "fun at the workplace" OR "fun of work" OR "fun of working" OR "work fun" OR "workplace fun"). The data retrieval was performed in the middle of May 2021, and the publication timeframe was set until 2020. Afterward, the initial document-checking process found two duplications and 14 documents without abstracts, yielding 125 articles for the period until 2020. Thirty-two articles with unrelated topics were removed after the title and abstract papers were read (i.e., discussing fun but not in the work or workplace context). Hence, 93 document data with abstracts were used in the present analysis, with the oldest document coming from 1988. Figure 2 shows the flow process of data retrieval.

Figure 2. Documents retrieval process



Analysis and Tools

In this study, we conducted several analyses, including a network of words co-occurrence analysis, author network analysis, and publication analysis.

Words co-occurrence was investigated to identify popular scientific research topics in fun work. Words co-occurrence analysis used words in the document (abstract, title, keywords) to find the connection between words and build a conceptual structure based on the idea. The concept behind a set of words that appear in the different documents is likely to have a related vision (Anderson, 2019; Zupic & Cater, 2015). The output of word co-occurrence analysis was a topic network of research in fun work, providing us with an overview of the field.

The author’s co-occurrence supplied the overview of research collaboration and the social structure of research in fun work (Zupic & Cater, 2015). Authors work in the same scientific research developed co-authorship. This method analyzed co-authorship among contributing researchers and created authorship networks of research in fun work.

Publication analysis delivers descriptive analysis of the literature in fun work. It consisted of publication frequency by years, publication frequency by journals or publishers’ name, the SJR score of the publications, and the number of citations. Publication frequency by year provides information about research trends in the given topic. It pre-

sents the prevalence overview of scientific research in fun work year by year and the rise of publications on a given topic. Publication frequency by journals provides information about the field of science or scientific setting most relevant to fun work.

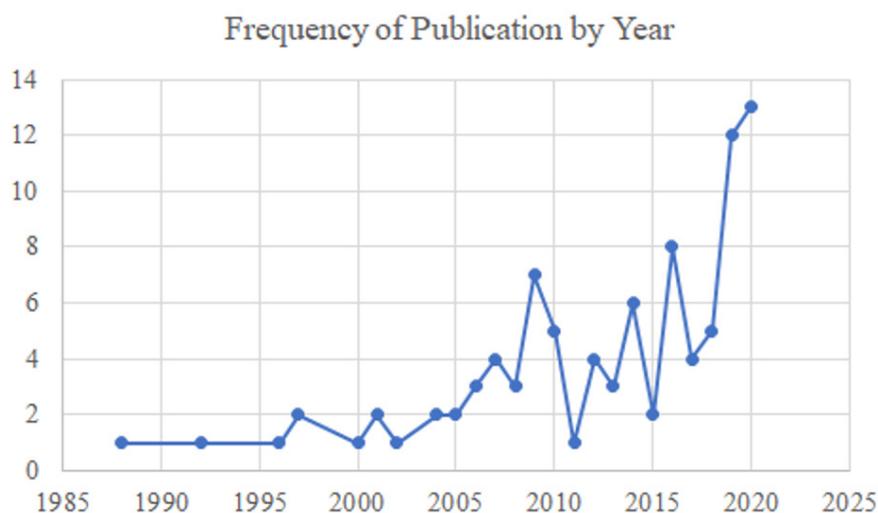
For the words co-occurrence and authors' co-occurrence, we used VOSViewer version 1.6.16 (Centre for Science and Technology Study, Leiden University) in our analyses. VOSViewers is software for constructing and visualizing bibliometric networks. The software extracts keywords, analyses the co-occurrence, and creates clusters based on the data. Words are used as indicators for the content of the research topic. Meanwhile, publication frequency by years and journals and SJR score were analyzed using frequency charts.

Literature Review

Publications Analysis

Ninety-three publications provided information about fun work. The first publications appeared in 1988; the present study's cut-off year is 2020. Figure 3 reveals the trend of research in fun work. Figure 3 shows that before 2005, the number of publications relating to fun work was low, and the growth was steadily slow. After 2005, fun work research started to show rapid growth, with a steep increase in 2019.

Figure 3. Documents retrieval process



In total, 93 publications were identified as research articles (80 documents), review articles (7 documents), conference papers (4 documents), and book chapters (2 documents). These had been cited 1,970 times, averaging 21.18 citations per article. These pub-

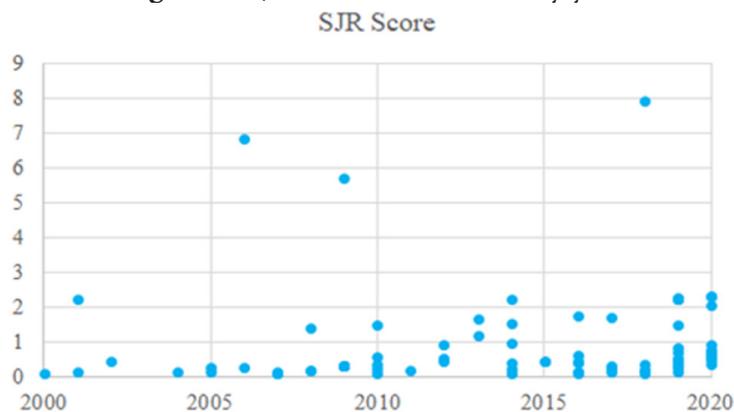
lications appeared in 64 journals, of which the Journal of Employee Relations produced the most and yielded 12 publications relating to fun work (Table 1).

Table 1. Top 10 academic journals with the most publications

Publication Name	Number of Articles
Employee Relations	12
International Journal of Hospitality Management	5
Journal of Human Resources in Hospitality and Tourism	3
Business Information Review	2
Health Care Manager	2
Human Relations	2
Human Resource Management International Digest	2
International Journal of Contemporary Hospitality Management	2
International Journal of Environmental Research and Public Health	2
International Journal of Mechanical and Production Engineering Research and Development	2

We also analyzed the SJR score of the 93 publications to evaluate the quality and relevance of the publications. SJR score represents the prestige of a journal. The SJR score is obtained from www.scimagojr.com. The score is obtained by considering the number of citations and the importance of publications cited in the journal. Since the SJR score was developed from the Scopus database, we only look for publications indexed by Scopus (Scimago Research Group, 2007). Note that for the same journals published twice or more in the same year, we count them as their frequency. The average SJR score is $M = .908$ ($SD = 1.344$, $Min. = .101$, $Max. = 7.936$). It suggested that the SJR score for research in fun work is low.

Figure 4. SJR score distribution by year



In addition to SJR score analysis, the number of articles published in that journal and the number of citations were used to measure the relevance and influence of the journals. Table 1 presented 11 journals that had published the most significant digit. Employee Relations Journal published the most with 12 papers, followed by the Internal Journal of Hospitality Management (5) and the Journal of Human Resources in Hospitality and Tourism (3). Table 2 revealed the most cited journals. The Top 5 journals that were cited the most were Employee Relation (439), Academy of Management Review (297), Human Relations (145), Business Information Review (115), and International Journal of Contemporary Hospitality Management (66).

Table 2. Top 10 academic journals with the most cited

Publication Name	Number of Citations
Employee Relations	439
Academy of Management Review	297
Human Relations	145
Business Information Review	115
International Journal of Contemporary Hospitality Management	66
International Journal of Hospitality Management	65
Journal of Applied Psychology	63
Journal of Leadership and Organizational Studies	57
Journal of Health and Human Services Administration	56
Journal of Non-profit and Public Sector Marketing	45

Author Network Analysis

Between 1988 and 2020, 172 authors contributed to 93 fun work publications. The top six authors with more than three publications were Michael J. Tews (Penn State University), John W. Michel (Loyola University Maryland), Robert C. Ford (University of Central Florida), A. Karl (University of Tennessee at Chattanooga), Barbara Plester (The University of Auckland Business School), and Simon C.H. Chan (The Hong Kong Polytechnic University). Table 3 revealed the number of authors with the highest number of publications. Of 93 publications with 172 contributing authors, 31 were single-authored, and 61 were multi-authored. To display the structure of the co-authors' relationship among contributing authors, we then examined the contribution of 172 unique authors by analyzing their co-occurrence and connection.

Table 3. The authors with the highest number of publications

Authors	Total link strength	Documents
Tews, M.J.	15	7
Michel, J.W.	11	5
Ford, R.C.	9	4
Karl, K.A.	7	4
Plester, B.	5	4
Chan, S.C.H.	1	4
Mclaughlin, F.S.	6	3
Newstrom, J.W.	6	3
Peluchette, J.V.	5	3
Xu, S.	6	2
Aquino, K.	5	2
Stafford, K.	5	2
Kim, W.	4	2
Morrison, R.L.	3	2
Owler, K.	3	2
Fineman, S.	1	2
Mousa, M.	0	2
Chou, C.M.	6	1
Han, J.	6	1
Hoffman, D.I.	6	1

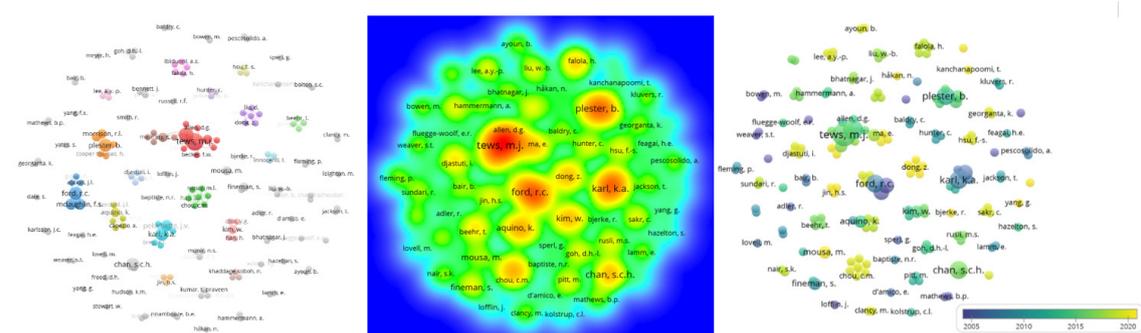
First, we conducted a co-authorship analysis. Figure 5a shows that there were seventy different node colors representing different clusters. Seven clusters with more prominent nodes (red, green, blue ocean, yellow, purple, blue sky, and orange clusters) consisted of more than six authors. The remaining clusters with smaller nodes had several authors ranging from one to five. The authors that represented the significant clusters were Tews (red), Nanche and Chou (green), Ford (blue ocean), Capezio (yellow), Dong and Liu (purple), Karl (blue sky), and Plester (orange).

Figure 5b presents a heatmap of the 172 individuals level co-authorship network. Heatmap helps us to visualize the profile of the articles. The co-authorship network heatmap allows the visualization of researcher frequency and connectivity in the given topic, also known as density. Figure 5b informed the density map from an analysis of 172 authors on fun work. The color intensity and font size indicated connectivity. The more intense color and the bigger font size indicated the higher connectivity in the neighborhood. The font size represented the frequency of the author's appearance in several publications. The colors ranged from red to green. The redder the color and parallel, the more extensive the circle, the denser the author's meaning, the more often it appeared in the other articles, and the more connected.

Four significant clusters (figure 5b) had the reddest color and the most enormous font size. They were Tews, Ford, Karl, and Plester clusters. Those clusters were predicted to be the most significant collaborators. Density offered an overview of 93 articles by showing which authors were necessary for analysis.

The period of article production is shown in Figure 5c. Dark bluer colors showed older articles, while yellower colors showed newer pieces. Karl Cluster was predicted to be a pioneer of fun work research and got stuck. Karl and Ford clusters were also heralded as pioneers and have continued their investigation. In comparison, Plester started her research on fun work late and stopped too soon. Afterward, Tews came later but produced fun work articles consistently. The yellow color wrote down recent research collaborations. Wang, Wang, Ma, Hoefnagel, and Joly are considered newcomers in this field. Between 2018 to 2020, Wang explored the role of play in the workplace in providing favorable outcomes to prevent employee burnout and increase employee productivity.

Figure 5. Documents retrieval process



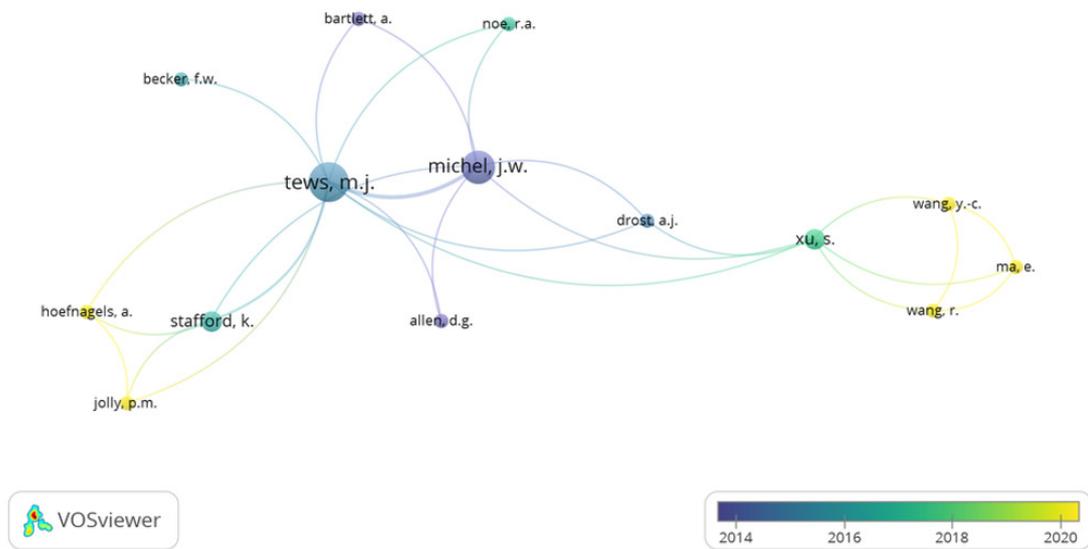
Network analysis also showed 14 authors with the most prominent nodes, indicating recurring research publications in fun work during the period (figure 6). Those 14 authors published ten journal articles that have been cited 239 times. Table 4 shows the number of publications and citations of the 14 most prominent network authors. Tews and Michel as the most central node indicating higher co-occurrence and stronger connections to other papers and publications, followed by Stafford, Jolly, Noe, Becker, Bartlet, Allen, Drost, Xu, Ma, Wang, and Wang. Figure 6 shows Tews and Michael as the most collaborators.

Table 4. Number of publications and citations of 14 authors with the most extensive network

Name	Number of Publications	Number of Citations
Tews	7	217
Michel	5	205
Stafford	1	43
Jolly	1	0
Noe	1	32
Becker	1	12
Barlett	1	57
Allen	1	51
Drost	1	22
Xu	1	22

Tews had been investigating fun work since 2012, made seven publications, and cited 217 other publications. Four out of 10 articles focused on the impact of fun in the workplace on employee turnover in the hospitality industry. The other three articles investigated the relationship between pleasure in the workplace and job embeddedness among millennials, the impact of enjoyment in work on the learning domain, and applicant attraction. Alola, Asongu, and Alola (2019), emphasized the significance of job embedment, highlighting its connection to favorable organizational outcomes like job satisfaction, innovative work behavior, and engagement. Michel had been exploring fun work since 2002 and published four papers with Tews as co-author. The latest research paper was published in 2017. Michel, Stafford, Jolly, Noe, Becker, Bartlett, Allen, Drost, and Xu were involved as Tews's research partners in seven publications on the positive effects of fun work.

Figure 6. The most extensive fun work co-authorships network.



Network of Words Co-Occurrence Analysis

This part identified the most frequent keywords in academic journals regarding fun work. We used at least three co-occurrence terms in VOSViewer and selected 60% of the most relevant comments from all words that met the threshold. As a result, only 89 keywords were retained for co-word analysis.

Of 89 keywords, five keywords (5.6%) appeared more than equal to 10 times, 46 keywords (51.7%) emerged 5 to 9 times and 38 keywords (42.7%) arose less than five times. Table 5 displays the top 13 occurring keywords and their total link strength. The total link strength refers to the number of links an item has with other objects and the overall strength of those connections. It encompasses the number of links an item has with other things and the combined strength or weight assigned to those links (Van Eck & Waltman, 2010). The fun work environment was the most occurring keyword for fun work topics in academic journals and was followed by development, value, strategy, and level. However, development was the most vital link keyword, followed by value, perception, strategy, and need.

Table 5. The most influential publications of co-word analysis

Label	Cluster	Total Link Strength	Occurrences
Fun Work Environ-ment	2	54	11
Development	2	81	10
Value	2	71	10
Strategy	2	69	10
Level	10	58	10
Perception	3	70	9
Attitude	3	63	9
Staff	1	48	9
Problem	2	59	8
Influence	4	52	8
Difference	3	49	8
Group	1	45	8
Job Satisfaction	3	43	8
Need	1	69	7
Year	2	55	7
Consequence	3	54	7
Number	2	52	7
Play	3	45	7
Case	2	43	7
Task	1	28	7

2	25	age, attention, case, challenge, commitment, customer, definition, development, fun work, fun work environment, fun workplace, human resource, leader, nature, new employee, number, practitioner, problem, service, source, strategy, suggestion, supervisor, value, year.	The Environment of Fun Work
3	23	affective events theory, attitude, consequence, difference, direction, everyone, experienced fun, feeling, greater level, higher job satisfaction, job performance, job satisfaction, level, organizational citizenship behavior, part, perception, play, positive attitude, positive effect, salience, task performance, total, turn.	The positive impact of fun work
4	12	addition, co-worker socializing, dimension, diversity, employee turnover, form, influence, manager support, opportunity, respect, retention, and turnover.	Support to fun work

Four clusters emerged from the words co-occurrence network analysis. Table 6 summarizes the findings with details of the terms and themes for each group.

Red cluster: Activities to make work fun

The first cluster that emerges is papers that discuss activities to make work fun. In this theme, researchers investigate research topics such as humor and games to find their associations with fun work. Two prominent examples are Romero and Pescosolido (2008) and Plester (2009), which discuss how humor could lead to workplace fun. Another famous example is Dale (2014), who discusses workplace gamification to make work fun. Further, Chan (2010) breaks fun work activities into four types: staff-oriented, supervisor-oriented, social-oriented, and strategy-oriented. There were three forms of workplace creating fun: managed, organic, and task fun (Plester & Hutchison, 2016). However, for making fun activities, we had to consider the type of employee, such as the generation gap (Lamm & Meeks, 2009), gender, position, tenure, and education (Nnamboozee & Parumasur, 2016).

Green cluster: Fun work environment system

The second cluster is research about fun work environment systems. Here, the green group emphasizes the design of the workplace that is associated with fun. For example, Fleming

and Sturdy (2009) highlight the neo-normative control management that does not restrain employees from being themselves in the workplace. Joy in a work environment becomes essential since the workplace is a serious and stressful place. Hence, support between organization and manager for developing and executing something perceived as fun activities was crucial to becoming a functional, fun workplace (Ford, Newstrom, & McLaughlin, Making workplace fun more functional, 2004). Before fun work became popular, ISO 9000 had already instructed employers to create a fun work environment (Stewart, 1996). At the same time, Berdahl and Aquino (2009) reported that sexual behavior at work (for example, sexual jokes and propositions) had happened, and some men and women employees felt enjoyed. However, it was harmful to employee work and well-being. This research echoed (Chen & Ayoun, 2019) finding that aggressive humor (sarcasm or irony) was considered a significant part of acceptable in-group members as well as helping foster a sense of identity and community.

Blue cluster: Positive effects of fun work

The third emerging cluster indicates how fun work can create positive effects. Some positive outcomes include higher job satisfaction, higher job performance, and organizational citizenship behavior (Choi, Kwon, & Kim, 2013). It has also been found that fun work can attract new talents (Tews, Michel & Bartlett, 2012). Based on Chan and Mak (2016), the relationship between workplace fun and employee job satisfaction was mediated by trust in management. Also, the superior level of fun in the workplace correlated with workplace fun, trust in management, and job satisfaction. Tews, Michel, and Noe (2017) claimed that fun activities were also significantly related to informal learning; they helped the learning process from other employees and non-interpersonal sources. Fun and enjoyable management techniques had advantages in attracting new employees, better customer satisfaction, more substantial employee commitment, lower employee turnover and absenteeism, and increasing job satisfaction, creativity, and an act of citizenship (Ford, McLaughlin, & Newstrom, 2004).

Yellow cluster: Support for fun work

The final cluster that appears is support for fun work. Not all employers support or agree with fun work, although it shows many benefits. The prominent example for this cluster is from Tews, Michel, and Stafford (2013). They discussed that supporting fun work from managers was a critical factor in reducing turnover, although it adversely affects performance. In addition, Tews, Michel, and Allen (2014) found that manager support and high-quality co-worker relationships were vital in reducing turnover value. The study by Nair and Nair (2018) also showed that organizational support for employee engagement increased productivity, retention, commitment, and profitability.

Discussion

This paper extensively explores research papers on the science of fun work spanning the last three decades, utilizing the Scopus database as the primary source of inquiry. The primary goal is to comprehend the trajectory of fun work research and identify distinct research streams by delving into the critical topic of fun work in academic literature. It also introduces a nuanced perspective on managed fun, acknowledging its potential coerciveness while highlighting how organic fun liberates individuals from compulsion. This perspective underscores the importance of fun related to tasks, challenging the conventional notion of a strict work-fun divide. The study illuminates the complexities and tensions surrounding fun at work, offering a rich tapestry of diverse views and experiences among organizational members (Plester, Cooper-Thomas, & Winqvist, 2015). The multifaceted exploration of the science of fun work presented in this paper contributes to a comprehensive understanding of the subject. It paves the way for further research and practical implications in diverse organizational contexts. The surge in the development of fun work becomes palpable in 2019, indicative of a heightened interest in this dynamic subject.

Examining the top three most cited publications associated with fun work reveals *Employee Relations* (with 439 citations), *Academy of Management Review* (with 297 citations), and *Human Relations* (with 145 citations). This analysis serves as an integral part of performance analysis, dissecting the contributions of research constituents to the overarching topic. The frequency of sources serves as a barometer of a journal's influence, with a higher count symbolizing robust interest and exerting a substantial impact on the evolution of fun work research.

The co-author heatmaps unveil four hotspots, denoting frequent collaborations, with the Tews cluster emerging as the most extensive and vibrant. This cluster also garners the highest number of citations, underscoring heightened productivity and a profound interest in the subject matter. The more significant number of citations is a marker of productivity and a strong collective interest in the topic.

This paper identifies four clusters emanating from the co-occurrence network analysis, representing distinct research streams in the science of fun work. These four streams encapsulate the fun work environment system, activities aimed at infusing fun into work, the positive effects of fun work, and support structures for fostering fun work.

McDowell's seminal work in 2004 asserts a significant correlation between a fun climate, the intention to leave, and organizational commitment. This research not only establishes the nexus between job satisfaction and a fun environment but also introduces the multidimensional construct of fun climates, as conceptualized by Fluegge (2008) and McDowell (2004). This construct encompasses socializing, celebrating, personal freedoms, and global fun. Socializing reflects enjoyable interactions with colleagues, celebrating incorporates formal fun activities, personal freedoms denote the freedom to enjoy work,

and global fun assesses the overall fun quotient of the workplace. ISO 9000 guidelines advocate for implementing a fun work environment, positing its critical role in enhancing employee productivity (Stewart, 1996), thus emphasizing the collective responsibility of all organizational elements in cultivating a fun work culture.

Furthermore, many studies substantiate the benefits of fun work, including heightened job satisfaction, job performance, and organizational citizenship behavior. Chan's (2019) research underscores that employees' perception of fun at the workplace can moderate the positive relation between participative leadership and work engagement and job satisfaction. This highlights the managerial imperative to foster fun activities at work, ranging from casual lunch gatherings to game days and other friendly activities aimed at engaging employees. Tews, Michel, and Noe's (2017) survey of 206 managers accentuates the significant contribution of fun activities to informal learning. However, the impact of managerial support for fun exhibits variation, emphasizing the strategic integration of fun into informal learning by considering individual personalities for optimal effectiveness. Djastuti et al. (2019) establish that organizational commitment and job satisfaction act as mediators for the impact of fun work, significantly influencing employee performance, particularly in manufacturing companies. The positive correlation between workplace satisfaction and job performance is echoed by Russell (1988), who proposes that reduced sick leave usage can indicate a fun workplace. Dempcy and Tihista's (1981) research adds depth by positing illness as a product of stress caused by over-commitment to a job, prolonged work hours under extreme pressure, and neglect of personal well-being.

The integral role of Human Resource Management (HRM) in fostering a fun work environment to increase employee commitment is emphasized by Fineman (2007). Empirical research by Chan and Mak (2016) identifies trust in management as a mediator between workplace fun and employee satisfaction. Leaders play a vital role in supporting a conducive environment (Alif & Nastiti, 2022). Chen and Ayoun (2019) highlight the positive correlation between supervisor support for a fun work environment and higher job embeddedness, underscoring the indispensable role of leaders and human resource management in supporting a fun work environment. The findings strongly advocate for leaders to not only encourage playful work design but also inspire their teams to incorporate humor. Chen and Ayoun (2019) go a step further by suggesting that organizations, especially in the hospitality industry, should actively cultivate a culture of fun and humor.

In addition, leadership style also has a vital role in creating a fun environment in the workplace. For example, Syahrul (2020) states that an empowering leadership style increases employee intrinsic motivation (feeling motivated, happy, and enthusiastic in their job). This condition is related to emerging psychological empowerment (meaningful, competent, impactful, and connected) in the employee (Meng, Zou, He, & Luo, 2015).

Not only intrinsic motivation, Thomas and Velhouse (1990) track psychological empowerment also affect employee satisfaction.

Becker and Tews (2016) provide a comprehensive definition of fun activities at work, encompassing various activities conducted during work hours or sponsored by the workplace. These activities are designed to encourage employee socialization, providing avenues for enjoyment, leisure, and play distinct from work-related responsibilities. Ford, McLaughlin, and Newstrom (2003) identify three categories of fun work elements:

1. Recognition of personal milestones (such as birthdays and anniversaries).
2. Social events (such as picnics, parties, and social gatherings).
3. Public celebrations of professional achievements (such as award bouquets).

In 2009, Bolton and Houlihan introduced a matrix exploring managerial motivations for introducing workplace fun. This matrix incorporates HR strategies and management perspectives. It delineates four primary dimensions: fun as a developmental reward, fun as engagement, fun as a means of alleviation, and fun as a form of containment.

In addition, other research underscores the role of humor (Romero & Pescosolido, 2008; Plester, 2009) and gamification (Dale, 2014) in promoting a fun environment in the workplace. Humor, broadly defined as any expression eliciting a positive cognitive or emotional reaction, serves as a collaborative tool, stress buffer, and social interaction enhancer (Romero & Cruthirds, 2006). Aligning this definition with various forms of enjoyment implies that humor from colleagues constitutes a subset of the coworker socializing aspect of enjoyment. In contrast, humor from a manager forms a subset of managerial support for enjoyment.

On the other hand, Fleming and Sturdy's (2009) exploration of Sunray's implementation of a culture program entitled "the 3Fs: Fun, Focus, Fulfilment" provides valuable insights into how a company aims to emphasize "being yourself" in the workplace. However, this culture is perceived as a form of neo-normative control, as outlined by five related dimensions observed at Sunray:

1. Reinforcement of societal constructions: Sunray reinforces societal constructions of identity, framing diversity in specific ways such as sexuality, consumerism, and playfulness rather than considering broader aspects like occupational skills or familial roles.
 2. Implicit and explicit limits: Despite encouraging individualism and creativity, there are limits to self-expression. Organized events, such as the Away Day, may exclude those who do not conform to the expected "fun" and "different" persona, contradicting the rhetoric of a laissez-faire approach.
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3. Appropriation of identities for productive ends: The regime at Sunray appropriates and partially constructs identities, mainly focusing on youthfulness, sexuality, and enthusiasm. These characteristics enhance customer service and contribute to the overall "fun" atmosphere as part of the job.
4. Self-disciplinary control: The encouragement and visibility of private identities at Sunray lead to a form of self-disciplinary control. Individual success and failure are attributed to the type of person an employee is, fostering a judgmental environment based on how well they embrace the 3Fs program.
5. Resistance and the "be yourself" philosophy: The "be yourself" philosophy at Sunray is seen as a controlling element, inspiring a unique form of resistance. While normative control often leads employees to hide their real identities, at Sunray, the control function encourages the expression of real identities. The passage raises questions about how resistance manifests when employees are encouraged to be themselves.

The idea of fun is subjective, varying from person to person, and the concept is elusive. A clear conceptual understanding of fun is necessary to avoid difficulties when investigating the connections between fun and organizational outcomes. The variability in individuals' experiences of fun contributes to a lack of agreement on what constitutes fun for members within an organization (Owler, Morrison, Plester, 2010; Aldag & Sherony, 2001; Ford et al., 2003; Plester & Sayers, 2007; McDowell, 2004; Warren & Fineman, 2007). Smith and Lewis (2011) introduce the "dynamic equilibrium model of paradox," unveiling how organizations handle diverse perspectives, leading to internal tensions due to differing perceptions and demands. This model sheds light on the intricate nature of workplace fun, particularly the challenges posed by managed fun organized by managers.

Conclusion

This study showed that there has been an increasing trend in fun work research. Since 2005, the number of publications on fun work has accelerated and showed a steep rise in 2019, indicating the increased interest in fun work.

According to the co-authorship network analysis, there were 172 authors who yielded 70 co-authorship clusters based on the heatmap. Out of these clusters, there were four significant ones. We also presented a heatmap of the co-authorship network. It identified the four most prominent contributor authors on fun work literature: Michael J. Tews, R. Ford, Barbara Plester, and Katherine Karl.

We identified four clusters of research streams: activities to make work fun, a fun work environment, positive effects of fun work, and support for fun work. These clusters are also known as research fronts in literature. Recognizing different research fronts can serve as a source of inspiration for researchers to determine the direction in which a particular discourse should progress. Alternatively, it can help identify areas where discussions are lacking and introduce new topics for exploration.

It is anticipated that the exploration study of fun work will inspire new scholars to engage in this emerging field. Furthermore, the findings from the examination of relevant literature will assist researchers in defining the scope of their current research and identifying potential future research paths.

Limitations

While this study contributes valuable insights into the scientific structures and relationships within the field of fun work through bibliometric analysis, it is essential to acknowledge its limitations. These limitations can guide future research and investigations in this area.

Firstly, selecting search terms and query formulation plays a crucial role in the outcomes of bibliometric analyses. In this study, the specific search terms chosen may have unintentionally excluded influential sources and scholars in the field of fun work. Future research may yield a more diverse set of keywords that would provide different results and summarize more relevant publications and researchers. This requires an investigation of various combinations of keywords, synonyms, and related terms that capture the multidimensional nature of joy work to ensure completeness. This will increase the likelihood of detecting all publications and authors who may have made significant contributions to the field but were not included in the initial analysis. With a set of search terms that better cover the diversity of a particular field of study, one can increase the level of representativeness and inclusivity of bibliometric analysis and ultimately provide a better understanding of its development and influential contributors.

Secondly, this study relies on the Scopus database for analysis, mainly due to the SJR score for academic publications provided by Scopus. While this approach ensures consistency and reliability in assessing the impact and significance of included publications, it is essential to acknowledge that other sources may offer alternative and diverse perspectives on the subject matter. Future research could expand its scope by including other databases and sources, as this research is interdisciplinary and can utilize several sources. Adding other databases, such as Web of Science or Google Scholar, would have resulted in a broader range of literature searched for this study, allowing identification of research published in non-traditional academic media, along with gray literature and

publications targeting practitioners. Therefore, an expanded approach such as this will make field examinations more inclusive and enable a wider range of views to be captured, thereby increasing the insight and relevance of research findings.

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References

- Adams, D. 2019. Publish or Perish version 7. Retrieved January 10, 2022, from Research in International Management: <https://harzing.com/blog/2019/09/publish-or-perish-version-7>.
- Alif, M. I., & Nastiti, T. 2022. Empowering leadership in creativity and work effort: An elucidation through the psychological empowerment and self-leadership of the millennials generation. *Gadjah Mada International Journal of Business*, 24(3), 269-288.
- Alola, U. V., Asongu, S., & Alola, A. A. 2019. Linking supervisor incivility with job embeddedness and cynicism: The mediating role of employee self-efficacy. *Gadjah Mada International Journal of Business*, 21(3), 330-352.
- Anderson, N. 2019. Mapping the expatriate literature: a bibliometric review of the field from 1998 to 2017 and identification of current research fronts. *The International Journal of Human Resource Management*, 32(22), 4687-4724.
- Araújo, M.S.G. de, and P.M.P.R. Lopes. 2015. "Virtuous Leadership, Organizational Commitment and Individual Performance." *Tékhnē - Review of Applied Management Studies*. Instituto Politécnico do Cávado e do Ave (IPCA).
- Berdahl, J., & Aquino, K. 2009. Sexual Behavior at Work: Fun or Folly? *Journal of Applied Psychology*, 94(1), 34-47.
- Bolton, S.C. and Houlihan, M. 2009. Are we having fun yet? A consideration of workplace fun and engagement. *Employee Relations*, 31(6), 556-568.
- Chan, S. C. 2010. Does workplace fun matter? Developing a useable typology of workplace fun in a qualitative study. *International Journal of Hospitality Management*, 29(4), 720-728.
- Chan, S. C. 2019. Participative leadership and job satisfaction: The mediating role of work engagement and the moderating role of fun experienced at work. *Leadership & Organization Development Journal*, 40(3), 319-333.
-

- Chan, S. C., & Mak, M. 2016. Have you experienced fun in the workplace? An empirical study of workplace fun, trust-in-management, and job satisfaction. *Journal of Chinese Human Resource Management*, 7(1), 27-38.
- Chen, H., & Ayoun, B. 2019. Is negative workplace humor really all that "negative"? Workplace humor and hospitality employees' job embeddedness. *International Journal of Hospitality Management*, 79, 41–49.
- Collins, J. C., & Porras, J. 2005. *Built to last: Successful habits of visionary companies*. Random House.
- Crawford, C. B. 1994. Theory and implications regarding the utilization of strategic humor by leaders. *Journal of Leadership Studies*, 1(4), 53-68.
- Dale, S. 2014. Gamification: Making work fun, or making fun of work? *Business information review*, 31(2), 82–90.
- Deal, T., & Kennedy, A. 1982. *Corporate cultures: The rites and rituals of corporate life*. Reading, MA: Addison-Wesley.
- Dempsy, M., Tihista, R., & Watson, R. R. 1981. *Your Stress Personalities: A Look at Your Selves*. Presidio Press.
- Djastuti, I., Rahardjo, S. T., Irviana, L., & Udin, U. 2019. Fun at Work and Employee Performance: The Roles of Job Satisfaction and Organizational Commitment in Manufacturing Companies. *WSEAS Transactions on Business and Economics*, 16, 153-162.
- Ferreira, F. A. 2018. Mapping the field of arts-based management: Bibliographic coupling and co-citation analyses. *Journal of Business Research*, 85(1), 348–357.
- Fineman, S. 2006. On being positive: Concerns and counterpoints. *Academy of Management Review*, 31(2), 270–291.
- Fleming, P. 2005. Workers' Playtime: Boundaries and Cynicism in a 'Culture of Fun' Program. *Journal of Applied Behavioral Science*, 41, 285–303.
- Fleming, P., & Spicer, A. 2004. 'You Can Checkout Anytime, but You Can Never Leave': Spatial Boundaries in a High Commitment Organization. *Human Relations*, 57(1), 75–94.
- Fleming, P., & Sturdy, A. 2009. "Just be yourself!" Towards neo-normative control in organisations?. *Employee relations*, 31(6), 569–583.
- Fluegge, E. R. 2008 Who put the fun in functional? Fun at work and its effects on job performance (Unpublished doctoral dissertation). *University of Florida*, Gainesville.
- Ford, R. C., McLaughlin, F. S., & Newstrom, J. W. 2003. Questions and answers about fun at work. *Human Resource Planning*, 26(4), 18–33.
- Ford, R. C., Newstrom, J. W., & McLaughlin, F. S. 2004. Making workplace fun more functional. *Industrial and Commercial Training*, 36(3), 117–120.

- Ford, R., McLaughlin, F., & Newstrom, J. 2004. Having fun at work. *Engineering Management*, 14(2), 32–33.
- Frederick W. Becker & Michael J. Tews. 2016. Fun activities at work: Do they matter to hospitality employees? *Journal of Human Resources in Hospitality & Tourism*, 15(3), 279-29.
- Georganta, K., & Montgomery, A. 2019. Workplace fun: A matter of context and not content. *Qualitative Research in Organizations and Management: An International Journal*, 14(3), 317–336.
- Gin Choi, Y., Kwon, J., & Kim, W. 2013. Effects of attitudes vs experience of workplace fun on employee behaviors: Focused on Generation Y in the hospitality industry. *International journal of contemporary hospitality management*, 25(3), 410–427.
- Karl, K., Peluchette, J., & Hall, L. 2008. Give them something to smile about A marketing strategy for recruiting and retaining volunteers. *Journal of Nonprofit and Public Sector Marketing*, 20(1), 91-96.
- Kraus, S., Filser, M., Eggers, F., Hills, G. E., & Hultman, C. M. 2012. The entrepreneurial marketing domain: a citation and co-citation analysis. *Journal of Research in Marketing and Entrepreneurship*, 14(1), 6-26.
- Lamm, E., & Meeks, M. 2009. Workplace fun: the moderating effects of generational differences. *Employee Relations*, 31(6), 613-631.
- McDowell, T. 2004. Fun at work: Scale development, confirmatory factor analysis, and links to organizational outcomes (Unpublished doctoral dissertation). *Alliant International University*, San Diego, CA.
- McMurray, A., & Scott, D. 2003. The relationship between organizational climate and organizational culture. *Journal of American Academy of Business, Cambridge*, 3(1), 1–8.
- Meek, A. 2015. Google's head of HR shares his hiring secrets.
- Meng, Y., Zou, L., He, J., & Luo, C. (2015). Supervisors' leadership and health science researchers' intrinsic motivation: The mediate role of psychological empowerment. *Nankai Business Review International*, 6(1), 68-81.
- Michel, J. W., Tews, M. J., & Allen, D. G. 2019. Fun in the workplace: A review and expanded theoretical perspective. *Human Resource Management Review*, 29(1), 98-110.
- Nair, S., & Nair, B. C. 2018. Employee Engagement Practices in Organized Retail Sector: An Empirical Study with Respect to Ernakulam Town. *International Journal of Engineering & Technology*, 7(3), 453-455.
- Nnamboozee, E. B., & Parumasur, S. B. 2016. Understanding the multigenerational workforce: Are the generations significantly different or similar? *Corporate Ownership and Control*, 13(2), 224-237.

- Owler, K., Morrison, R. and Plester, B. 2010, Does fun work? The complexity of promoting fun at work. *Journal of Management and Organization*, 16(3), 338-352.
- Owler, K., Morrison, R., & Plester, B. 2010. Does fun work? The complexity of promoting fun at work. *Journal of Management & Organization*, 16(3), 338-352.
- Peters, T., & Waterman, R. H. 1982. *In search of excellence: Lessons from America's Best-Run Companies*. New York: Harper and Row.
- Plester, B. 2009. Crossing the line: Boundaries of workplace humour and fun. *Employee Relations*, 31(6). 584-599.
- Plester, B., & Hutchison, A. 2016. Fun times: The relationship between fun and engagement. *Employee Relations: The International Journal*, 38(3), 332-350.
- Plester, B., Cooper-Thomas, H., & Winqvist, J. 2015. The fun paradox. *Employee Relations*, 37(3), 380-398.
- Radhakrishnan, S., Erbis, S., Isaacs, J. A., & Kamarthi, S. 2017. Novel keyword co-occurrence network-based methods to foster systematic reviews of scientific literature. *PLoS ONE*, 12(3), e0172778.
- Romero, E. J., & Cruthirds, K. W. 2006. The Use of Humor in the Workplace. *The Academy of Management Perspectives*, 20(2), 58-69.
- Romero, E., & Pescosolido, A. 2008. Humor and group effectiveness. *Human relations*, 61(3), 395-418.
- Schmidt, E., & Rosenberg, J. 2014. *How Google works*. Grand Central Publishing.
- SCImago Research Group. 2007. Description of Scimago journal rank indicator. Retrieved March, 3, 2018.
- Smith, W. K., & Lewis, M. W. 2011. Toward a theory of paradox: A dynamic equilibrium model of organizing. *Academy of Management Review*, 36(2), 381-403.
- Stewart, W. 1996. ISO 9000 work instruction-subject: fun. *The TQM Magazine*, 8(4), 17-19.
- Syahrul, K. 2020. The effect of empowering leadership on intrinsic motivation: the role of psychological empowerment as a mediation. *Journal of Leadership in Organizations*, 2(2).
- Tews, M. J., Michel, J. W., & Bartlett, A. 2012. The Fundamental Role of Workplace Fun in Applicant Attraction. *Journal of Leadership & Organizational Studies*, 19(1), 105-114.
- Tews, M. J., Michel, J. W., & Stafford, K. 2013. Does fun pay? The impact of workplace fun on employee turnover and performance. *Cornell Hospitality Quarterly*, 54(4), 370-382.
- Tews, M., Michel, J., & Allen, D. 2014. Fun and friends: The impact of workplace fun and constituent attachment on turnover in a hospitality context. *Human Relations*, 67(8), 923-946.

Tews, M., Michel, J., & Noe, R. A. 2017. Does fun promote learning? The relationship between fun in the workplace and informal learning. *Journal of Vocational Behavior*, 98, 46-55.

Thomas, K. W., & Velthouse, B. A. 1990. Cognitive elements of empowerment: An “interpretive” model of intrinsic task motivation. *Academy of Management Review*, 15(4), 666-681.

Tsaur, S. H., Hsu, F. S., & Lin, H. 2019. Workplace fun and work engagement in tourism and hospitality: The role of psychological capital. *International Journal of Hospitality Management*, 81, 131-140.

Van Eck, N., & Waltman, L. 2010. Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics*, 84(2), 523-538.

Vogel, R., & Guttel, W. H. 2013. The dynamic capability view in strategic management: A bibliometric review. *International Journal of Management Reviews*, 15(4), 426-446.

Zupic, I., & Cater, T. 2015. Bibliometric methods in management and organization. *Organizational Research Methods*, 18(3), 429-472.

Appendix

Table 1. Top 10 academic journals with the most publications

Publication Name	Number of Articles
Employee Relations	12
International Journal of Hospitality Management	5
Journal of Human Resources in Hospitality and Tourism	3
Business Information Review	2
Health Care Manager	2
Human Relations	2
Human Resource Management International Digest	2
International Journal of Contemporary Hospitality Management	2
International Journal of Environmental Research and Public Health	2
International Journal of Mechanical and Production Engineering Research and Development	2

Table 2. Top 10 academic journals with the most cited

Publication Name	Number of Citations
Employee Relations	439
Academy of Management Review	297
Human Relations	145
Business Information Review	115
International Journal of Contemporary Hospitality Management	66
International Journal of Hospitality Management	65
Journal of Applied Psychology	63
Journal of Leadership and Organizational Studies	57
Journal of Health and Human Services Administration	56
Journal of Non-profit and Public Sector Marketing	45

Table 3. The authors with the highest number of publications

Authors	Total link strength	Documents
Tews, M.J.	15	7
Michel, J.W.	11	5
Ford, R.C.	9	4
Karl, K.A.	7	4
Plester, B.	5	4
Chan, S.C.H.	1	4
Mclaughlin, F.S.	6	3
Newstrom, J.W.	6	3
Peluchette, J.V.	5	3
Xu, S.	6	2
Aquino, K.	5	2
Stafford, K.	5	2
Kim, W.	4	2
Morrison, R.L.	3	2
Owler, K.	3	2
Fineman, S.	1	2
Mousa, M.	0	2
Chou, C.M.	6	1
Han, J.	6	1
Hoffman, D.I.	6	1

Table 4. Number of publications and citations of 14 authors with the most extensive network

Name	Number of Publications	Number of Citations
Tews	7	217
Michel	5	205
Stafford	1	43
Jolly	1	0
Noe	1	32
Becker	1	12
Barlett	1	57
Allen	1	51
Drost	1	22
Xu	1	22

Table 5. The most influential publications of co-word analysis

Label	Cluster	Total Link Strength	Occurrences
Fun Work Environ- ment	2	54	11
Development	2	81	10
Value	2	71	10
Strategy	2	69	10
Level	10	58	10
Perception	3	70	9
Attitude	3	63	9
Staff	1	48	9
Problem	2	59	8
Influence	4	52	8
Difference	3	49	8
Group	1	45	8
Job Satisfaction	3	43	8
Need	1	69	7
Year	2	55	7
Consequence	3	54	7
Number	2	52	7
Play	3	45	7
Case	2	43	7
Task	1	28	7
Focus	1	27	7
Creativity	1	44	6
Addition	4	42	6
Commitment	2	42	6

Table 6. Four fun work words co-occurrence themes

Cluster	N of Words	Words (After)	Theme
1	29	ability, attempt, communication, content, creativity, emergence, emotion, employee performance, expectation, fact, focus, game, generation, group, humor, need, negative emotion, organizational culture, positive impact, sense, staff, stress, task, team, view, work environment, work fun, workforce.	Activities of Fun Work
2	25	age, attention, case, challenge, commitment, customer, definition, development, fun work, fun work environment, fun workplace, human resource, leader, nature, new employee, number, practitioner, problem, service, source, strategy, suggestion, supervisor, value, year.	The Environment of Fun Work
3	23	affective events theory, attitude, consequence, difference, direction, everyone, experienced fun, feeling, greater level, higher job satisfaction, job performance, job satisfaction, level, organizational citizenship behavior, part, perception, play, positive attitude, positive effect, salience, task performance, total, turn.	The positive impact of fun work
4	12	addition, co-worker socializing, dimension, diversity, employee turnover, form, influence, manager support, opportunity, respect, retention, and turnover.	Support to fun work

Figure 1. Google's Book Ngram Viewer for fun work.

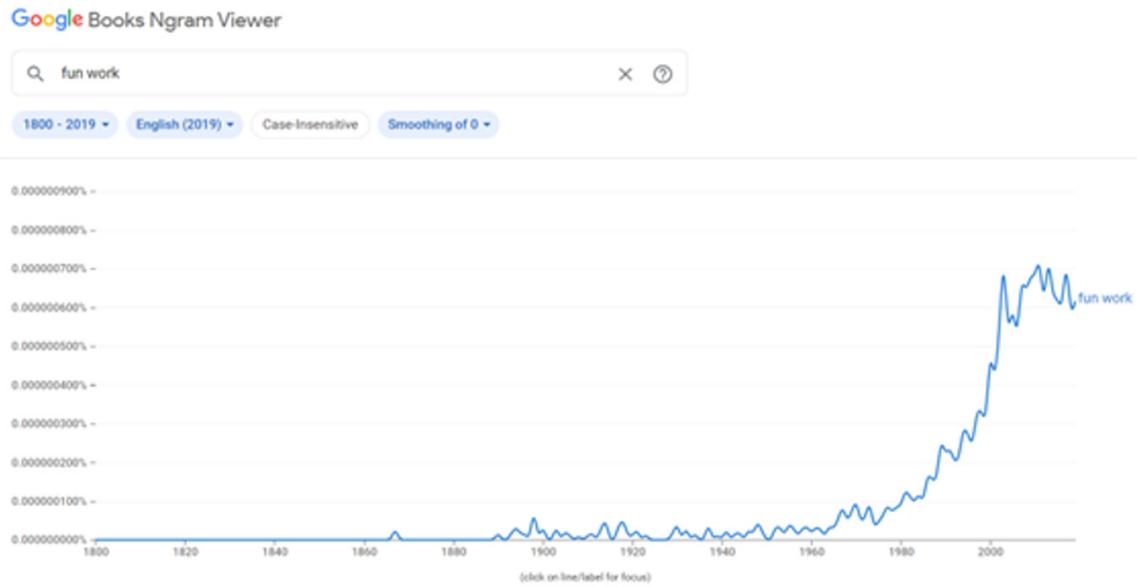


Figure 2. Documents retrieval process

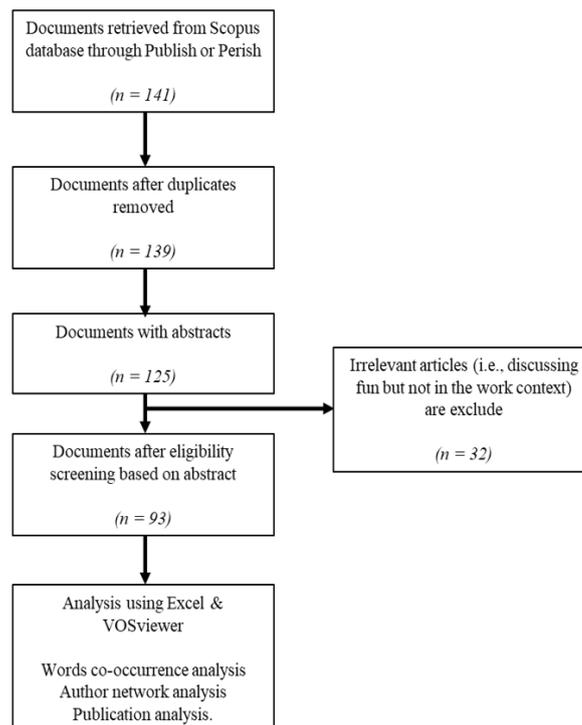


Figure 3. Documents retrieval process

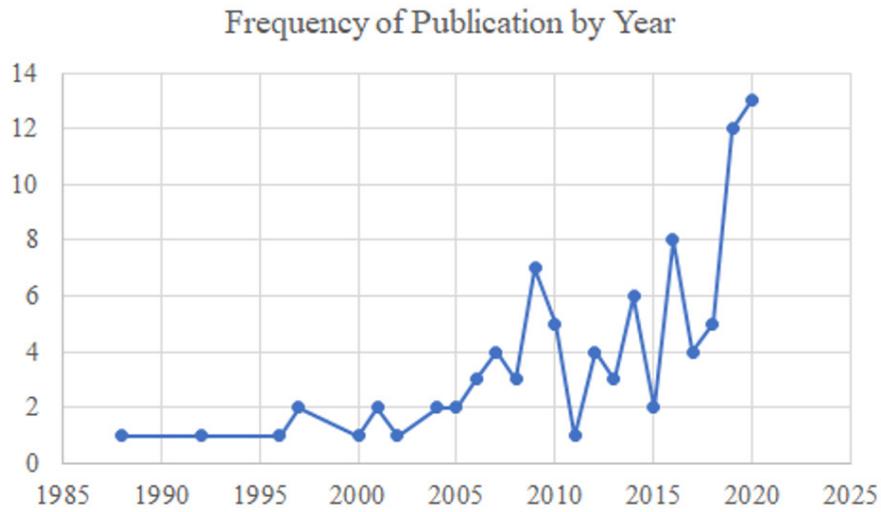


Figure 4. SJR score distribution by year

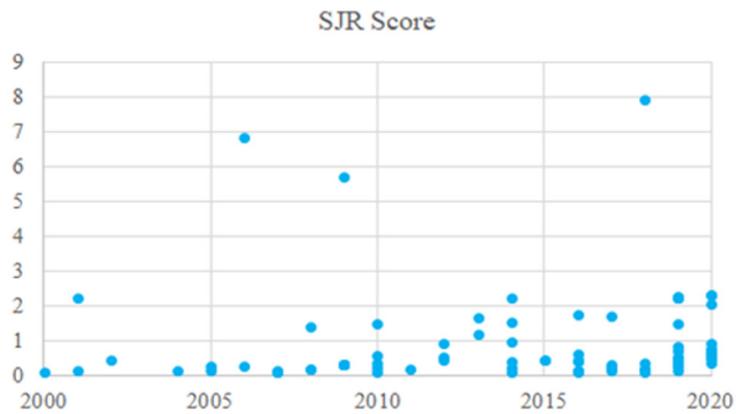


Figure 5. Documents retrieval process

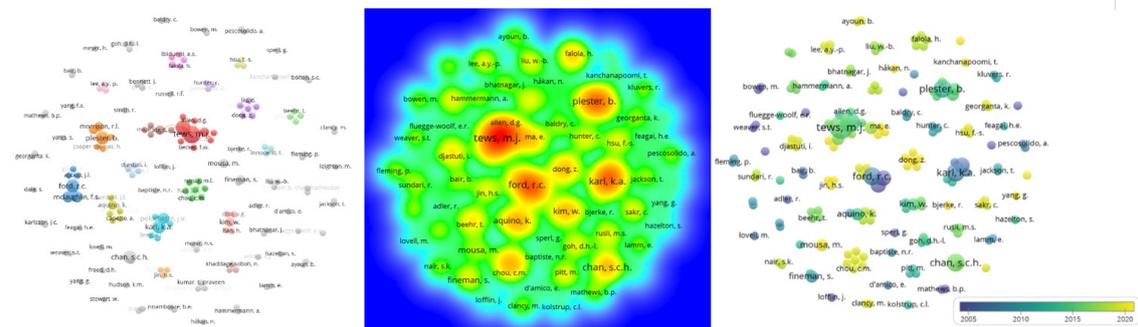


Figure 6. The most extensive fun work co-authorships network.

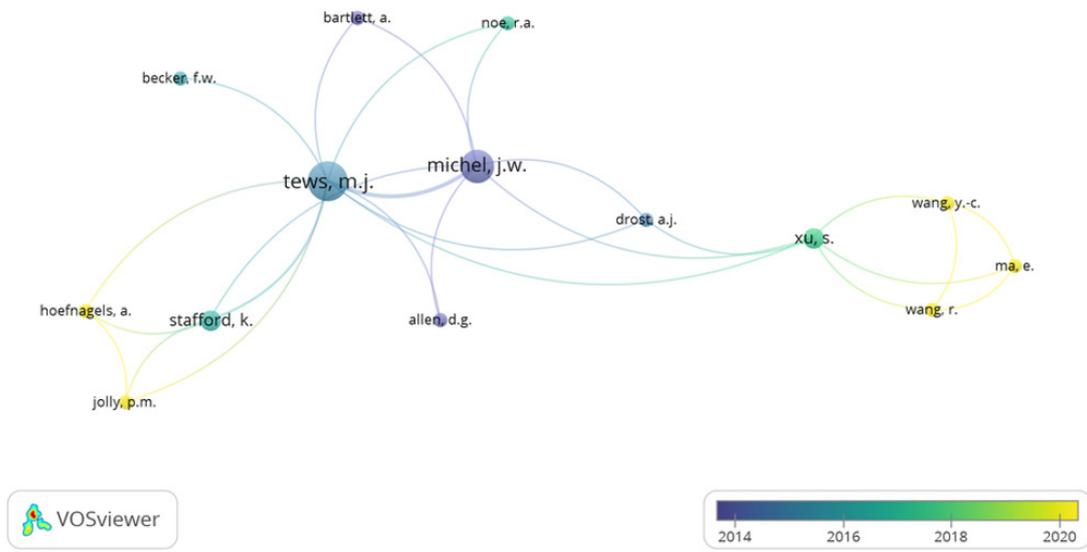
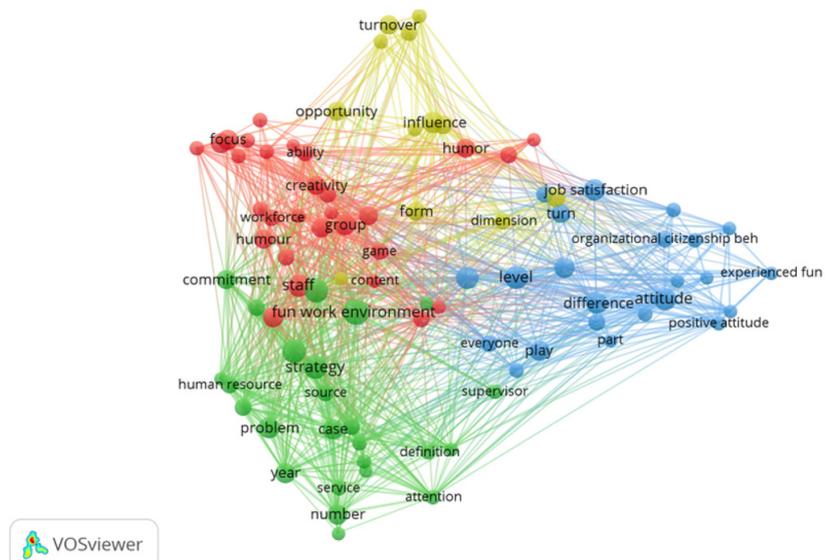


Figure 7. Fun work words co-occurrence by clusters



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