# What are the drivers of competitive advantage coming from green intellectual capital during 2022 global economic crisis?

# Koji su pokretači konkurentske prednosti koji dolaze iz zelenog intelektualnog kapitala tokom globalne ekonomske krize 2022?

*Miloš Petković*

Singidunum University, Faculty of Business, Belgrade, Serbia /
Univerzitet Singidunum, Poslovni Fakultet, Beograd, Srbija

e-mail: mpetkovic@singidinum.ac.rs

orcid.org/0000-0002-1989-0504

**Abstract:** This research article aims to investigate the drivers of competitive advantage coming from green intellectual capital in S&P 500 biggest US companies in the period of 2022 global economic crisis. A qualitative lexical content analyses were done on 226 corporate news from 1st of January 2022 until 31st of December 2022, with 4.509.138 words and 12.856 pages. The research study identified 5 main drivers: (1) sales; (2) cash; (3) products and services; (4) shares, and (5) leadership. The paper proves that biggest US companies listed on New York Stock Exchange (NYSE) and indexed on S&P 500 index highlighted sales, cash, products and services, market shares and leadership as 5 main drivers of competitive advantage during 2022 economic crisis. The paper contributes to the literature by proposing precise drivers that influence positively on company's long-term advantage, however, the specific drivers of this relationship have not been fully explored until now. The findings of this study provide insights for organizations looking to leverage green intellectual capital for sustainable performance and competitive advantage.

**Keywords:** green intellectual capital, financial performance, competitive advantage, S&P 500.

**Sažetak:** Istraživački rad teži da istraži pokretače konkurentske prednosti koji dolaze od zelenog intelektualnog kapitala na uzorku od 500 najvećih američkih kompanija u periodu globalne ekonomske krize 2022. Zeleni intelektualni kapital predstavlja znanje, veštine i ekspertizu kompanijskih zaposlenih koji se odnose na ekološku održivost, kao i organizacionu sposobnost da upravlja i koristi ovo znanje za ostvarivanje održivih performansi. Kvalitativne leksičke analize sadržaja su primenjene na 226 korporativnih vesti od 1. Januara 2022 do 31. Decembra 2022, sa 4.509.138 reči i 12.856 stranica. Rad je identifikovao 5 glavnih pokretača: (1) prodaja; (2) novac; (3) proizvodi i usluge; (4) akcije, i (5) liderstvo. Rad dokazuje da su najveće američke kompanije listirane na Njujorškoj berzi (NYSE) i indeksirane na S&P 500 indeksu označile prodaju, novac, proizvode i usluge, akcije i liderstvo kao 5 glavnih pokretača konkurentske prednosti tokom 2022 globalne ekonomske krize. Rad doprinosi nauci po tome što predlaže konkretne pokretače koji utiču pozitivno na kompanijsku dugoročnu konkurentsku prednost, međutim, specifični pokretači ovakve veze do sada nisu bili u potpunosti istraženi. Rezultati ove studije pružaju uvid organizacijama koje žele iskoristiti zeleni intelektualni kapital za održivi performans i konkurentsku prednost.

**Ključne reči:** zeleni intelektualni kapital, finansijska performansa, konkurentska prednost, S&P 500.

INTRODUCTION

The concept of green intellectual capital has gained significant attention in recent years as organizations seek to gain a competitive advantage in the marketplace. Green intellectual capital refers to the knowledge, skills, and expertise of an organization's employees related to environmental sustainability, as well as the organization's ability to manage and leverage this knowledge to achieve sustainable performance (Yusliza et al., 2020). Authors Petković & Džamić (2020) widely explored the topic of green intellectual capital and its importance in the corporate world. This paper aims to explore the drivers of competitive advantage coming from green intellectual capital, specifically examining the role of employee engagement, innovation, and reputation.

The main research objective of this paper is to explore corporate news disclosure in S&P 500 biggest US companies and identify drivers of competitive advantage coming from green intellectual capital. Drivers are the main factors or independent variables that influence on competitive advantage during 2022 economic crisis. Most of the literature focus only on short-term and immediate results such as sales, share prices and profits, and not so much on long-term, stable and constant economic benefits.

The research paper has three main contributions to the existing literature. First, we contribute to the science by proposing the factors that create company's competitive advantage. Second, we document intensity and coverage of corporate communication. Finally, we list precise narratives of each factor and indicators that are explained in the clusters text formations.

The paper is organized as follows: first, we review the literature on green intellectual capital and its relationship to organizational performance. Next, we discuss the potential drivers of competitive advantage coming from green intellectual capital, including employee engagement, innovation, and reputation. Finally, we conclude with a discussion of the implications of these findings for organizations and future research.

1. LITERATURE REVIEW

*1.1. Importance of green intellectual capital in corporate world*

Green intellectual capital has been widely explored and published in literature in recent years. However, the specific drivers of this relationship have not been fully explored. This literature review aims to examine the latest research on the drivers of competitive advantage coming from green intellectual capital, including employee engagement, innovation, and reputation.

Employee engagement has been identified as a potential driver of competitive advantage coming from green intellectual capital. Research has found that engaged employees are more likely to develop and apply their knowledge and skills related to sustainability (Kodden, 2020). Similarly, a study by Rodrigues et al. (2017) found that employee engagement in environmental sustainability practices positively affects green intellectual capital and leads to improved organizational performance. These findings suggest that organizations that foster employee engagement in green initiatives may be able to leverage green intellectual capital for a competitive advantage.

Innovation is another potential driver of competitive advantage coming from green intellectual capital. Organizations with a strong green intellectual capital may be more likely to develop and implement sustainable practices and products (Zhu et al., 2005). A study by Liu et al. (2022) found that green intellectual capital positively affects organizational innovation in the green technology industry, leading to improved organizational performance. The study found that green intellectual capital positively impacts green innovation in manufacturing companies, leading to increased market competitiveness. These findings suggest that organizations that invest in green intellectual capital may be able to gain a competitive advantage through green innovation.

The literature suggests that employee engagement, innovation, and reputation may be important drivers of competitive advantage coming from green intellectual capital, but not the only ones. Organizations that foster employee engagement in green initiatives, invest in green intellectual capital for green innovation, and maintain a positive reputation in the eyes of consumers and other stakeholders may be able to leverage green intellectual capital for sustainable performance and competitive advantage. Future research could explore these drivers in more depth, as well as investigate other potential drivers of competitive advantage coming from green intellectual capital.

*1.2. Impact of green intellectual capital on company's success*

The link between green intellectual capital and a company's competitive advantage has gained significant attention in recent years as organizations seek to gain a sustainable competitive advantage in the marketplace. The literature on green intellectual capital has primarily focused on the positive relationship between green intellectual capital and organizational performance (Capatina et al., 2019; Camfield et al., 2018). A number of studies have found a positive relationship between green intell-

ectual capital and a company's financial performance. A study by Jiao et al. (2022) found that green intellectual capital positively affects a company's financial performance, specifically through its impact on environmental management practices. A study by Obeidat et al. (2021) also found that green intellectual capital positively affects a company's financial performance, through its impact on green innovation and green marketing. A study by Rodrigues et al. (2017) found that employee engagement in environmental sustainability practices positively affects green intellectual capital and leads to improved competitive advantage. Authors Li et al. (2021) also found that green intellectual capital positively affects a company's competitive advantage by enhancing green innovation, green product development, and green supply chain management.

In addition to the direct link between green intellectual capital and a company's financial performance, some studies have found that green intellectual capital also has an indirect impact on financial performance through its impact on other factors. A study by Li et al. (2019) found that green intellectual capital positively affects a company's reputation, which in turn positively affects the company's financial performance. Similarly, a study by Zhu et al. (2020) found that green intellectual capital positively affects a company's customer loyalty, which in turn positively affects the company's financial performance. Reputation may also play a role in competitive advantage coming from green intellectual capital. Consumers and other stakeholders may prefer to do business with companies that are seen as environmentally responsible (Carroll, 1991). A study by Zhu et al. (2022) found that green intellectual capital enhances corporate social responsibility reputation and leads to increased customer loyalty, which in turn positively affects the company's competitive advantage.

However, it is important to note that not all studies have found a positive relationship between green intellectual capital and a company's financial performance. A study by Nr & Yurniwati (2018) found that the relationship between green intellectual capital and financial performance is not necessarily positive and may depend on other factors such as the company's industry and its environmental management practices.

Finally, the literature suggests that there is a positive relationship between green intellectual capital and a company's financial performance. green intellectual capital has a direct impact on a company's financial performance through its impact on environmental management practices, green innovation, and green marketing. Additionally, green

intellectual capital has an indirect impact on a company's financial performance through its impact on other factors such as reputation and customer loyalty. However, it's important to note that the relationship between green intellectual capital and financial performance may depend on other factors such as the company's industry and its environmental management practices. Future research could explore these factors in more depth, as well as investigate other potential ways in which green intellectual capital may impact a company's financial performance.

### 1.3. Green intellectual capital in crisis moments

The global economy is currently facing a significant crisis due to the COVID-19 pandemic (Akhtaruzzaman et al., 2021; Burdekin & Tao, 2021). The crisis has highlighted the need for a more resilient and sustainable economy (Boubaker et al., 2022; Nemlioglu & Mallick, 2021), which can be achieved through the development of green intellectual capital. Green intellectual capital refers to the knowledge, skills, and abilities of an organization's workforce that are dedicated to promoting environmentally sustainable business practices (Shah et al., 2021). Petković (2022) qualitatively explored the link between green intellectual capital and competitive advantage of biggest US banks during Covid-19 crisis. The findings proved importance of green intellectual capital in overpassing crisis moments and enhancing resilience of company.

Recent research has shown that organizations with a strong commitment to green intellectual capital have been able to weather the economic downturn caused by the pandemic better than those without such commitment (Rodrigues et al., 2017). This is because green intellectual capital can lead to cost savings, such as through energy efficiency, and can also increase revenue through the development of new green products and services (Shah et al., 2021). Additionally, organizations with green intellectual capital are more likely to have a positive reputation, which can attract customers and investors (Li et al., 2020).

However, while green intellectual capital can provide a competitive advantage in times of economic crisis, it can also be a significant investment. Organizations must invest in the development and training of their workforce in order to build green intellectual capital (Shah et al., 2021). Furthermore, organizations must also implement environmentally sustainable business practices, which can also be costly (Li et al., 2020).

In conclusion, green intellectual capital can provide a competitive advantage for organizations during times of economic crisis. However, it requires

significant investment in the development and training of the workforce and the implementation of environmentally sustainable business practices. As the global economy continues to recover from the COVID-19 pandemic, it is crucial that organizations invest in green intellectual capital in order to build a more resilient and sustainable economy.

## 2. METHODOLOGY

### 2.1. Corpus text explanation and preparation

Data sample is composed of corporate news publicly available on the official websites of 500 biggest US companies. All companies are listed on New York Stock Exchange (NYSE) and indexed on S&P 500 index. The corporate news were observed from 1st of January 2022 until 31st of December 2022.

The text corpus composes of corporate news of 500 largest US companies from S&P 500 index basket in 2022 global economic crisis. The corpus text is composed of 226 corporate articles, 12.856 pages and 5.509.138 words of pure text. The whole text was copied into the txt document, and applied in the IRaMuTeQ software. The software possess the English managerial dictionary. The software's dictionary will allow the whole sample corpus text to group or lemmatize into different clusters. Each clusters is related to a specific topic, and words are grouped around topic they belong. In that way, we will identify different groups or drivers, their intensity in public speaking and particular narratives.

### 2.2. Content Analysis by Textual Statistical Software

For the purpose of this study, the IRaMuTeQ software will be used. The software was developed by Pierre Ratinaud from Laboratory LERASS, University Toulouse, France in 2008, and until now has been widely used not only in managerial sciences, but also in other. What makes this software unique is very developed and rich English managerial dictionary with Bibliometric package from R software. This software was developed on Python language that allows creating a protocol for performing textual analysis. Many authors proved the software's rigor and quality textual analysis (Albertini et al., 2021; Goulart et al., 2020; Ramos et al., 2019). The textual analysis has an objective to link words to its natural context, because meaning directly depends on the positions in some semantic textual space. Albertini (2021) highlighted two main rules to be considered: *first*, words are connected to the lemma or group they belong, and *second*, words frequency is considered very important in the whole corpus text.

The computerized lexical content analysis was applied within the study with IRaMuTeQ software because of sample size composed of 50 corporate news, and in total 40,126 words. This method allows

us to highlight the strategic plans of companies through the textual analysis of the topic of green intellectual capital.

### 2.3. Findings

Here we applied two analyses: Reinert's method and Word Cloud method.

Reinert's method

This phase showed that the corpus is composed of 17.719 forms, 142.517 text segments, 15.096 lemmas, which covered 88.02% of the corpus. These are the elements classified into 5 main categories (Figure 1).

Figures 1 and 2 allowed us to better understand the relationship between the categories (variables) in the factor plan. In order to be considered in the clustering analysis, each word has to be repeated minimum 10 times. As we can see, 5 main categories are present, where clusters 4 and 5 are divided from clusters 1, 2 and 3 that are closely connected. Cluster 1 is related to sales and is directly linked to Cluster 2 – Cash. On top of that, Cluster 3 – Products and services influences on the previous two. Because of the very close similarity between these three clusters, they are all closely positioned to each other. On the other side, Clusters 4 and 5 are representing shares and leadership respectively. Clusters 1, 2 and 3 appear to be very close to each other with 16.1%, 11.9% and 18.1% presence respectively. Separately, cluster 4 possess 27.1% of the corpus text, whereas cluster 5 26.8%. We can conclude that company's performance depends on the leader of the company on the financial market, taking into consideration products and services' sales and cash.

Category 1 in red consists of vocabulary related to sales (revenue, income, payment, net, current, etc). Category 2 in gray is related to cash (money, operate, liquidity, currency, etc.). Category 3 in green represents products and services (offer, supply, product, services, customer, deliver, etc.). Category 4 in blue is linked to shares (stocks, financial instruments, securities, market, eps, etc.). Finally, category 5 in purple is about leadership (management, ceo, director, board, etc.).

In the Figure 3, five main variables are visible in the factor plan. Factorial analysis calculates chi-square correlation values for each variable and frequencies, as well as produces distances of words from the initial corpus text. X-axis presents distance and distribution from variables. Y-axis indicates a tangibility of relationship between variables. The position of every variable is very important and it shows how the five variables are distributed. Both abscissa and ordinate can have positive or negative values. Classes 1, 2 and 3 are in the field of negative

abscissa and positive ordinate. Class 4 is in field the both negative abscissa and ordinate. Class 5 is in the field of both positive abscissa and ordinate. From the above mentioned, we can justify that Classes 1, 2 and 3 are with close and strong tangible relationship.
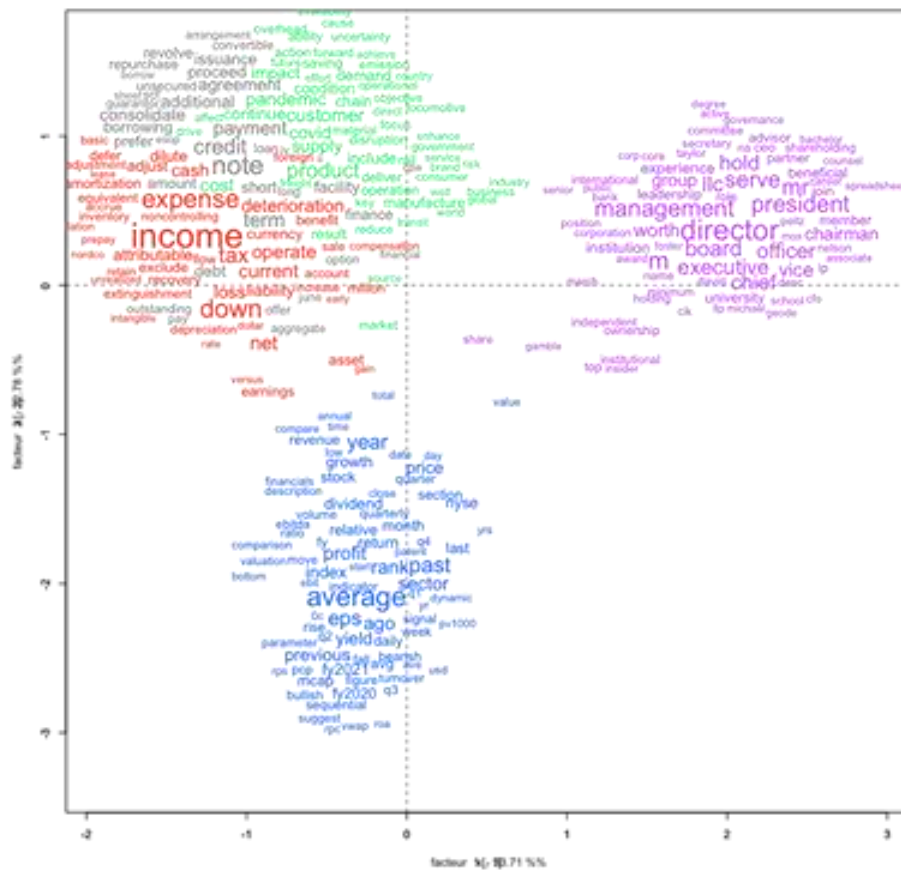


*Figure 1. Semantic clouds of 5 categories of corporate news published by observed companies*
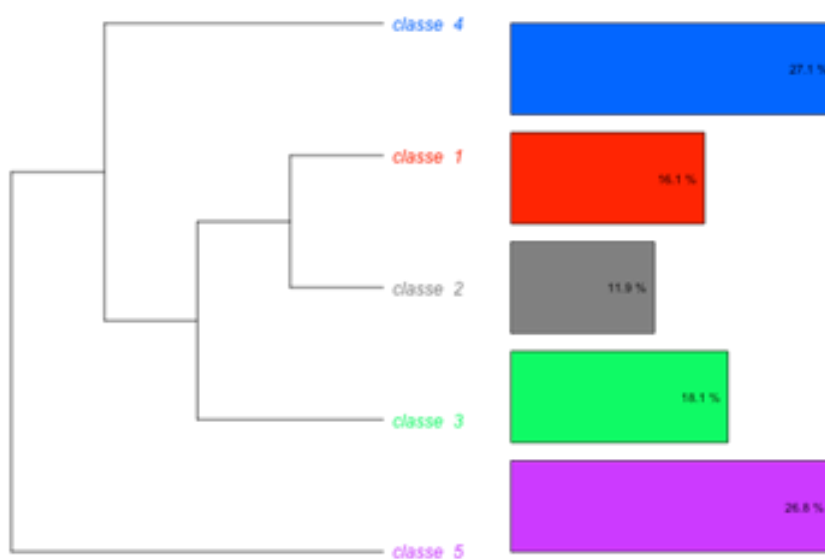*Source: Author's calculation*



*Figure 2. Dendrogram of 5 main classes of corpus text*
*Source: Author's calculation*

*Table 1. Categories revealed in the phase 1*

| Category | Color code | Name | % of forms analyzed |
|----------|-----------|------|---------------------|
| Category 1 | Red | Sales | 16.1% |
| Category 2 | Gray | Cash | 11.9% |
| Category 3 | Green | Products and services | 18.1% |
| Category 4 | Blue | Shares | 27.1% |
| Category 5 | Purple | Leadership | 26.8% |

Source: Author's calculation



*Figure 3. Location of the classes in the Factor plan*
*Source: Author's calculation*

*Word Cloud Analysis*

The Word Cloud analysis presents lexicographical formations of words with the highest representativeness within the corpus text.

*Table 2. First 10 Most Frequent Active Forms*

| Form | Frequency | POS |
|------|-----------|-----|
| Shares | 30.763 | Noun |
| Value | 18.557 | Noun |
| Cash | 17.449 | Noun |
| Sales | 17.300 | Noun |
| Revenue | 14.619 | Noun |
| Leadership | 11.927 | Noun |
| Director | 11.922 | Noun |
| Product | 10.725 | Noun |
| Stock | 10.481 | Noun |
| Service | 5.741 | Noun |

Source: Author's calculation



*Figure 4. Word Cloud Analysis*
*Source: Author's calculation*

The Word Cloud analysis visualize the lexico-graphy of the most frequent and representative words from the initial corpus text. The words that represent key variables are taken for this analysis, such as cash, sales, revenue, products, services, leadership, director, value, stock and shares.

## CONCLUSION

In conclusion, this research aimed to investigate the drivers of competitive advantage coming from green intellectual capital. The paper identified five main clusters or variables using qualitative lexical content analysis. The paper focused on S&P 500 companies during the 2022 global economic crisis. The paper is composed of 226 different corporate news, 12.856 pages of pure text and 4.509.138 words. This study found that green intellectual capital positively affects a company's competitive advantage through its impact on cash, sales, products and services, shares and leadership. Furthermore, green intellectual capital can lead to enhanced green innovation, green product development, and green supply chain management, which in turn can lead to improved competitive advantage.

The results of this study suggest that employee engagement, innovation, and reputation are important drivers of competitive advantage coming from green intellectual capital. Organizations that enhance employee engagement in green initiatives, invest in green intellectual capital for green innovation, and maintain a positive reputation in the eyes of consumers and other stakeholders may be able to leverage green intellectual capital for sustainable performance and competitive advantage.

Future research could explore these drivers in more depth, as well as investigate other potential drivers of competitive advantage coming from green intellectual capital. Also, it would be beneficial to investigate the relationship between green intellectual capital and competitive advantage in different industries and in organizations of different sizes. This research provides a foundation for future studies on green intellectual capital and competitive advantage and the importance of this topic for organizations in today's society.

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