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ORGANIZACIJA

Organizacija (Journal of Management, Informatics and Human Resources) is an interdisciplinary peer-reviewed journal which is open to contributions of high quality, from any perspective relevant to the organizational phenomena.

The journal is designed to encourage interest in all matters relating to organizational sciences and is intended to appeal to both the academic and professional community. In particular, journal publishes original articles that advance the empirical, theoretical, and methodological understanding of the theories and concepts of management and organization. The journal welcomes contributions from other scientific disciplines that encourage new conceptualizations in organizational theory and management practice.

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Topics are drawn, but not limited to the following areas:

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Teme so pokrivajo predvsem naslednja področja:

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- management človeških virov (kot so organizacija in razvoj zaposlenih, vodenje, ustvarjanje vrednosti s pomočjo človeških virov, organizacijski pojavi na delovnem mestu itd.);
- vodstveni in podjetniški vidiki izobraževanja;
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- podjetniški inženiring (npr. organizacijsko oblikovanje, upravljanje poslovnih procesov, paradigme preoblikovanja podjetij itd.);
- članki, ki analizirajo organizacijsko uspešnost in prizadevanja za izboljšanje le-te.

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An Examination of Generational Differences in the Sharing Economy: Understanding the Motivations of Idle Asset Owners and Their Impact on Peer-to-Peer Platform Management

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Background/Purpose: This research examines the dynamics of sharing idle assets on peer-to-peer (P2P) platforms within the sharing economy, focusing on understanding the motivational factors that influence asset owners across generations. Platforms that know what motivates asset owners to enter the sharing economy can more effectively set up and manage marketing communications and gain a competitive advantage.
Methods: A mixed-methods approach has been adopted, which includes both quantitative and qualitative data collection and analysis. The analytical tools used include descriptive statistics, Kruskal-Wallis test, PCA and Welch ANOVA.
Results: We identified four motivation factors. We found out that supply-side generational marketing is appropriate to use if the marketing message targets opportunistic factors (completely new) or social factors; for user-related and social factors, generational marketing is unnecessary, i.e., P2P platforms do not need to distinguish the segment they are targeting with the marketing communication.
Conclusion: This research reveals how generational differences impact motivations to participate in the sharing economy, aiding P2P platform management. It offers a novel, comparative analysis of generational motivators, enriching sharing economy literature and providing practical insights for targeting different generations effectively. Understanding the motivations of idle asset owners is key to managing the business of P2P platforms.

Keywords: *Consumer behaviour, Generation, Management, Marketing, P2P, Sharing economy*

JEL Classification: D16, E21, M31

1 Introduction

The essence of the sharing economy is the sharing and exploitation of idle assets. This economic model assumes that an asset owner shares his or her idle assets with a person who needs them at a certain time and under certain pre-agreed conditions. In the P2P model, a platform mediates the sharing between these two entities. The platform operates in a sharing economy environment, which is typically based on making a profit from brokering transactions between the supply side and the demand side. It

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must therefore know exactly who constitutes the supply side, who constitutes the demand side and how to reach these two parties with its marketing communication. This process can strengthen P2P competitiveness and help to gain a competitive advantage over other platforms and traditional businesses. The more the sharing economy grows, the more sustainability will be boosted.

For many years, companies offering their products have used demographic and psychographic variables (Kotler & Armstrong, 2010, age segmentation, or a combination of them to segment their customers (Chaney et al., 2017). Chaney et al. (2017) state that each age group has specific behaviours that companies can use to segment and set a specific marketing strategy. Although age is a frequent criterion for customer segmentation, generational segmentation may be more appropriate for companies to identify consumer motivations stemming from shared values and beliefs across generations (Khare et al., 2012; Schewe & Meredith, 2004). Eastman & Liu (2012) even suggest that consumption only depends on an individual's generation affiliation, without demographic factors (gender, income, education) playing any role. By using age segmentation in their marketing strategies, companies can enhance their competitiveness and achieve a competitive edge over other companies that do not employ this approach.

One way how companies can address the competitiveness issue is by understanding the generational cohorts. The importance of gaining competitive advantage in this text lies in the fact that generational cohorts are not static groups, but rather dynamic and evolving ones. As new generations enter the market, they bring with them new preferences, expectations, and behaviours that may differ from those of previous generations. We refer to the so-called generational cohort theory, in which individuals who experience similar historical, social, cultural, political, and economic events between their 17th and 23rd year of life are similar in their beliefs about fundamental social values and behaviour (Mannheim, 1952). Companies should identify the most substantial generational cohorts typical of a company's specific products and adjust the marketing mix accordingly to these generations (Chaney et al., 2017). Different generations not only require different approaches within marketing, but also within management (Molek et al., 2023). The sharing economy will follow this trend as well. Platforms must correctly define the customer segment (supply and demand side) they want to target with their marketing communications to remain competitive in a rapidly changing market. By doing so, they can create value propositions that resonate with their target segments and differentiate themselves from their competitors (Aljukhadar & Senecal, 2011).

To the best of our knowledge, there needs to be more research examining the impact of generational cohorts on participants' motivation to enter the sharing economy. We focused on this sustainability issue in our research. This information will provide a solid foundation for researchers and platforms in the sharing economy to understand what motivates each generation to enter the sharing economy from perspective of idle asset owners (supply side). Based on this, platforms can better set up a segmentation strategy and more effective marketing communications through a generational approach. Our research is based on a detailed literature review and quantitative and qualitative questioning. The main objective is to determine whether generational marketing can be used to increase the size of the sharing economy and thus boost sustainability.

2 Literature Review

2.1 Motivations for Entering the Sharing Economy

The motives for entering the sharing economy have been addressed by several authors, each of whom has looked at the issue from a different perspective. The most important motive for the functioning of the sharing economy is the willingness to share (Guyader et al., 2023). In general, motivations can be divided into intrinsic motivators and extrinsic motivators (Hamari et al.,2015), which can bring both financial and non-financial benefits (Gazzola et al., 2018).

An examination of internal and external factors was conducted by Hamari et al. (2015). Internal factors include the pleasure of sharing and the possibility to promote sustainability, while external factors include gaining a good reputation and economic reasons (saving money, easy access to resources and the possibility to freely dispose of the funds raised). Internal factors are considered stronger for participation in the sharing economy. They did not explore the importance of these factors in terms of the respondents' generational affiliation. A similar analysis was conducted by Guyader et al (2023). They investigated what factors influence the population to share. Specifically, they looked at trend orientation, sharing orientation, citizen engagement, and authenticity of sharing within the platform. They found that none of these factors had a direct effect on participation in the sharing economy (here specifically car sharing). However, they mention that age may play a role, i.e. respondents of different ages will want to participate in the sharing economy in different ways. Although Bäro et al. (2022) looked at sociodemographic characteristics (sex, age and education) that influence participation in the sharing economy, but their research was only in general terms, with no link to motivational factors. Moeller & Wittkowski (2010) addressed internal factors. They found that if a person feels that the sharing follows a trend, they are more likely to participate in the sharing economy. Participants in the sharing economy must trust the platform through which the sharing takes place (Lazakidou et al., 2008). It is

trust that, according to Martínez-González (2021), stands at the interface between internal and external factors.

We can also look at motivations regarding whether they are financial or non-financial. The financial benefits are entirely unquestionable. However, they have not been investigated separately in specific research but have been mentioned as other factors related to motivation for joining the sharing economy. Fang & Li (2022) found that monetary savings, sustainability, interactivity, and authenticity motivate people to participate in the sharing economy. Interestingly, they mention that it is also essential for these people that the platform provides sufficient guarantees to its users and legal protection and has set strict operational procedures. Gazzola et al. (2018) also came up with similar motivations. They found that sustainability, socialization, or economic factors motivate participants to participate in the sharing economy. In contrast, motivations in the form of availability of idle assets and practicality were found to be insignificant. Asset owners are eventually transformed into business entities, i.e. the financial motivation is completely unquestionable (Mazurek, 2020). Among the non-financial benefits of the sharing economy, authors often mention sustainability, as in Fang & Li (2022) and Gazzola et al. (2018). Sustainability emerges as a future development direction in consumers' consumption decisions (Prothero et al., 2011). The more the population is part of the sharing economy, the better sustainable development can be achieved. Platforms need to realize that they can be instrumental in achieving this goal (Tu et al., 2023). If platforms know what motivates owners of idle assets to enter the sharing economy, they can gain a competitive advantage and support the boost of the sharing economy.

The most extensive scholarly work to date regarding the factors affecting motivation was conducted by Rossmannek & Chen (2023). They summarized the results of 152 studies. They found that the authors of these studies identified a total of 26 motivations (altruism, attitude, desire for uniqueness, economic benefit/motive, emotional value, enjoyment, familiarity, hedonic value/motivation, information quality, materialism, perceived behavioural control, perceived ease of use, perceived risk, perceived usefulness/value/benefits, price, reputation, satisfaction, service quality, sharing intention, social benefits, social influence, subjective norm, sustainability value/motivation, technical quality, trust, utilitarian motivation/benefits, word of mouth). They also analysed these motivations concerning the influence of the sharing sector (ride sharing, home sharing, fashion sharing, and car sharing), location (China, Europe, South/Southeast Asia, and the USA), and whether it is supply or demand. In this summary, they have analysed articles from 2015 to 2022. Given our analysis, this paper cannot be considered exhaustive. We found another motivation factors discussed by other authors: trend orientation (Guyader et al., 2023), proenvironmentalism (Guyader et al., 20232018), meeting new people, socializing (Gazzola et al., 2018), opportunity to be part of a community (Parameswaran & Whinston, 2007), interactivity, authenticity, warranty, legal protection, strict operating procedures (Fang & Li, 2022), grassroots engagement (Guyader et al., 2023), contributing to a significant change in the economy, flexibility of "doing business", reduction of risk and liability arising from ownership (Benoit et al., 2017), or safe "business" (Yang & Ahn, 2016).

2.2 Research Objective

Based on literature review, we ask several research questions and derive specific hypotheses:

1. RQ1: What motivations are important for the idle asset owners?
2. RQ2: Are motivations dependent on the generation of respondents?
   - H0a: There is no significant relationship between generations and their motivation.
   - H1a: There is significant relationship between generations and their motivation.
3. RQ3: Is it possible to reduce the motivations into some motivational factors? Are these fators dependent on the generation of respondents?
   - H0a: There is no significant relationship be tween generations and their motivation factors.
   - H1a: There is significant relationship between generations and their motivation factors.
4. RQ4: Are there other motivations that affect idle asset owners in the sharing economy?

The first research question is related to the fact that previous research has tended to look at the demand side of idle assets (Zhu et al., 2017). In contrast, research examining the supply side has been relatively sparse (Rossmannek & Chen, 2023; Bucher et al., 2016). One of the few studies that distinguish between the supply and demand sides suggests a mismatch between the motivations of users of idle assets and their owners to use sharing economy services (Bellotti et al., 2015). However, more is needed to understand the issue in its full complexity, as in this study, the authors examined only a few motivations (ideological motivation, community, supply-side sustainability, need satisfaction, value enhancement, and demand-side convenience). In the study by Böcker & Meelen (2017), we find three more motivations (economic, environmental, and social), which the authors examined from a supply and demand perspective concerning the object of the sharing economy (accommodation, car, tool, ride, meal sharing). Benoit et al. (2017) distinguish the motives of the different actors. A customer who needs to share a product with someone else is motivated by financial, social, and utility factors and wants to reduce the risk and liability of ownership by sharing products. The owner of the asset is mo-

tivated by similar factors. The financial and social factors are the same, but another factor is referred to as business flexibility. As for the platform itself, it is also motivated by financial factors. However, the big motivation is that it creates a relationship between supply and demand, and at the same time, it is involved in a significant change in the economy, which the sharing economy undoubtedly is. Interesting research is presented by Angelovska et al. (2020). They investigate what factors motivate sharing economy customers to become providers. They find that customers motivated by altruistic motives and less by financial motives are more likely to become providers, i.e., to create a supply side in the sharing economy. Given the more than three dozen motivations identified, further research is needed to continue and expand the knowledge platforms in this area.

The second and third research question is related to the fact that previous research has primarily not addressed the generational perspective. Authors who have addressed the generational perspective in conjunction with motivations for participation in the sharing economy are much fewer than those who have addressed motivators from a general population perspective. For example, the generational perspective in terms of motivations for participation in the sharing economy has been explored by Alemi et al. (2018). They found that members of Generation Y are more likely to use Uber/Lyft services. In addition to the generational influence on this outcome, they report that those who travel, use smartphones more often, are pro-environment, tech-oriented, and desire diversity are more likely to participate in the sharing economy. These last three factors are additional motivating factors influencing participation in the sharing economy. Motivations (attitude, subjective norm, and perceived behavioural control) in Generation Z were investigated by Pham et al. (2021). They found that perceived behavioural control significantly influences whether this generation will demand the sharing mode. Intergenerational research was also noted by Mahadevan (2018), who looked at the motives of Baby Boomers, X and Y generations, among others, and compared how these generations differed from each other on selected motivations. He found, for example, that the difference between Generation X and Y is statistically significant for a motivation that is generally related to the sharing economy philosophy. However, he only looked at the demand side of the sharing accommodation. Generation Y was also addressed by Ranzini et al. (2017). They defined four motivations for entering the sharing economy, which they called economic, convenience, fun/social interaction, and reciprocity factors. They included cost reduction and additional income in the economic motives. We can find further research focusing on Generation Y in Sahelices-Pinto et al. (2021) or Lee et al. (2019). The authors mentioned above focused on the issue of sustainability as a motivating factor for Generation Y. They concluded that environmental issues are important for Generation Y, i.e., they are a more socially, culturally, and environmentally conscious generation than other generations. This opinion is confirmed by Jelinkova et al. (2021). They state that the younger a person is, the more important the sharing economy's economic, social, and environmental aspects are for them. Of note is the research of Martínez-González (2021), who examined nine motivations for Generation Z. They concluded that attitude and social norms are important motivators for this generation. According to them, general trust in the sharing economy links intrinsic and extrinsic motivators and encourages this generation to participate in the sharing economy. We are unaware of other scholarly publications on the issue of comparing Generations X, Y, and Z, which opens up space for further research.

The fourth research question is related to the extensive study by Rossmannek & Chen (2023). It has been shown that there are other motivations elaborated on by the authors in their papers, but the work of these two authors does not mention them. Therefore, the question arises as to whether other motivations have not been considered by previous research that are important for the functioning of platforms and supporting sustainability.

3 Methodology

3.1 Questionnaire Development

Based on a search of professional publications and research, we have compiled the first version of the questionnaire for our research investigation. We ensured content validity. The content validity of the data was rigorously evaluated through consultation with two subject matter experts in the field. All content validity indices were above the minimum value of 0.8 (Yusoff et al., 2021), i. e., the questionnaire´s scale has achieved a satisfactory level of content validity. We collected data in two phases.

The first phase was qualitative data collection, for which we used exploratory research using the focus group method. This research took place in early November 2022. Nine people participated in this research, evenly distributed among the generations of respondents X, Y, and Z analysed. In particular, the qualitative research revealed that in addition to general motivators, respondents might be motivated by platform-related motivators and idle assets. Based on the exploratory research, we enriched the first version of the questionnaire with additional motivations and finalized the questionnaire for quantitative data collection.

We divided the questionnaire into five parts. Due to the large amount of information collected, we only evaluated data related to motivations for this paper from the first and fifth part of questionnaire. First, we asked respondents if they knew what the sharing economy was. If they did not

Table 1: Motivations Overview.

Side	Abbreviation	Full Name
Supply	O_1	I will make some extra money
	O_2	I will meet new people
	O_3	I will help those who cannot afford the item by sharing
	O_4	I will rise with people around me (image) by sharing
	O_5	I support sustainability
	O_6	The app or website is user-friendly
	O_7	The sharing platform is known
	O_8	The platform can deal with insurance or damage to the loaned item
	O_9	The platform transparently handles user peer reviews
	O_10	I will be favoured if I ever want to borrow something myself
	O_11	I have trustworthy information about the customer

Source: Own

know, they could read a brief explanation of what can be understood by the sharing economy. The first part of the questionnaire focused on the motivating factors from the perspective of the idle asset owner and the customer interested in sharing the asset. The fifth part included demographic data (gender, birth year, residence size, educational attainment, and region). Table 1 provides an overview of these analysed motivations.

Respondents could express how motivated they would be by the analysed attributes on the following ordinal scale: (1) definitely not; (2) rather not; (4) rather yes; (5) definitely yes. We did not deliberately offer the middle option (3) to respondents, as we are inclined to the view of Sturgis et al. (2012), who states that when a respondent is given a choice of a middle answer, the researcher creates space for the respondent to avoid answering the question. Lucian (2016) argues that neutral attitudes are not possible as the respondent tends towards a specific answer. Although Adelson & McCoach (2010) state that midpoint surveys are more reliable, Nadler et al. (2015) reject this, stating that midpoint and non-centerpoint surveys generate similar results.

3.2 Data Collection and Sample Profile

The second phase involved collecting quantitative data using an online survey. We collected data from December 2022 to April 2023 in the Czech Republic through an online Google form. We used snowball sampling to obtain responses from respondents of different generations who are difficult to reach. We chose the snowball method to obtain a reasonably representative sample of respondents (Kirchherr & Charles, 2018). It is based on referring initially selected respondents to others who have a particular characteristic (Johnson, 2014). The age limit for participation in this research was 18 years, and access to the internet was a prerequisite for participation in the sharing economy. A total of 963 respondents participated in the research. We excluded 90 respondents because they were older than our research analysed. Finally, we have left 873 completely filled out questionnaires of the study population of respondents.

To compare the sample of respondents with the total population, we used data from the Czech Statistical Office (Census, 2021) and information collected by the Ministry of the Interior of the Czech Republic. In the Czech Republic in 2021, 51.42% of men and 48.58% of women lived in the analysed population of respondents (Generation X, Y, Z). Of these persons, Generation X accounted for 40.04%, Generation Y 33.94%, and Generation Z 26.02%. In our sample, we had 31.2% Generation X respondents, 31.5% Generation Y respondents, and 37.3% Generation Z respondents. Information from the Ministry of the Interior of the Czech Republic shows that as of 1 January 2023, 52.42% of the population over 15 years of age in the Czech Republic lived in places with populations under 10,000 inhabitants, 20.68% lived in places with populations under 50,000, 7.99% lived in places with populations under 100,000, and 19.91% lived in places with populations over 100,000. Our sample of respondents was over 18 years old and limited by Generation X, i.e., we cannot make an exact comparison with the population of the Czech Republic. The structure shows that our sample is very similar to the population of the Czech Republic. To compare the educational background of the population, we again used data from the Czech Statistical Office (Census, 2021). We focused on the 18+ population with the age restriction of Generation X. We found that in the Czech Republic in 2021, a total of 7.91% of people over 18 years of age lived

with primary education, 66.51% of the population with secondary education, 2.38% with higher vocational education and 23.20% with university education. Our sample of respondents reflected this structure similarly. As in the population, the largest proportion of our sample consisted of respondents with a higher professional education, followed by respondents with a university education.

Since our sample corresponds to the population distribution in the Czech Republic, it is replicable in terms of international comparisons while maintaining the population distribution in the selected country and the population can be compared in research by other authors.

3.3 Statistical Methods

We performed data analysis using SPSS statistical software. First, we analysed data reliability. For the data analysed (11 items), we checked the reliability using Cronbach's alpha. The value of this indicator was 0.811, indicating high reliability. Hair et al. (2013) state that it is important that the value exceeds the threshold of 0.7 in order for the data to be considered reliable. We performed a normality test on these 11 items. Kolmogorov-Smirnov and Shapiro-Wilk showed significance of less than 0.001 for all items, which is less than the alpha value of 0.05. These results are reason to think that our data differs significantly from a normal distribution. This may be due to a missing middle value of the answer. We cannot reject the null hypothesis that the data is not normally distributed.

In the second phase, we described the supply side motivations using descriptive statistics (mean, SD). Given the large number of supply side motivations, we decided to evaluate the data using principal component analysis (PCA) and varimax rotation method in order to identify the main motivating factors for idle asset owners to enter the sharing economy. Differences between generations of respondents in their primary motivation were evaluated using the Kruskal-Wallis test. Differences in factor loadings between generations of respondents were evaluated using the Welch ANOVA.

4 Results

4.1 RQ1: Important Motivations for Idle Asset Owners

We investigated an answer to RQ1 using descriptive In Table 2 we can see the differences between the three analysed generations based on descriptive statistics. From Table 2, we see that the strongest motivation for asset owners is O_11 for Generation X. On the supply side, the strongest motivation for Generation Y and Z is O_1. On the other hand, the weakest motivation is O_4 for all generations analysed, consistently.

Table 2: Descriptive Statistics – Supply Side

Motivations	Mean			SD		
	X	Y	Z	X	Y	Z
O_1	3.93	4.16	4.52	1.241	1.080	0.833
O_2	2.68	2.56	2.77	1.357	1.276	1.321
O_3	3.56	3.63	3.96	1.296	1.215	1.066
O_4	2.21	2.02	2.47	1.260	1.194	1.333
O_5	3.60	3.57	3.86	1.259	1.333	1.179
O_6	3.48	3.26	3.57	1.291	1.346	1.218
O_7	3.50	3.52	3.58	1.260	1.236	1.240
O_8	3.82	4.08	4.09	1.294	1.159	1.092
O_9	3.70	3.80	3.84	1.307	1.175	1.126
O_10	3.67	3.78	3.93	1.314	1.236	1.120
O_11	3.95	4.10	4.08	1.286	1.088	1.168

Source: Own

Table 3: Kruskal-Wallis test – Supply Side

Mot.	K-W H	Asymp. Sig. (p-value)	Sig.	ε2	Multiple Comparisons - adjusted significance (ε2)		
					X:Y	X:Z	Y:Z
O_1	49.917	<0.001	S	0.057	0.097	<0.001 (0.079)	<0.001 (0.007)
O_2	4.788	0.091	NS	x	x	x	x
O_3	18.132	<0.001	S	0.021	1.000	<0.001 (0.022)	<0.001 (0.022)
O_4	21.446	<0.001	S	0.023	0.122	<0.001 (0.010)	0.041
O_5	10.345	0.006	S	0.012	1.000	0.018	0.018
O_6	9.230	0.010	S	0.011	0.088	0.010 (0.001)	1.000
O_7	0.820	0.664	NS	x	x	x	x
O_8	6.433	0.040	S	0.007	0.097	0.068	1.000
O_9	0.268	0.875	NS	x	x	x	x
O_10	4.909	0.086	NS	x	x	x	x
O_11	0.910	0.634	NS	x	x	x	x

Source: Own

4.2 RQ2: Dependence of Motivations on Generation

We used the Kruskal-Wallis test to compare the medians of three groups of respondents. If the value of H is greater than the critical chi-square distribution, we can reject the null hypothesis and accept that at least one group is different from the others. Table 3 shows that the Kruskal-Wallis test showed statistically significant differences on the significance level 0.05 for some motivators on the supply side.

The Kruskal-Wallis H test indicated that there is a significant difference in the dependent variable between the different groups for O_1 ($\chi2(2) = 49.917$, $p < 0.001$, with a mean rank score of 375.98 for Generation X, 417.66 for Generation Y, 504.23 for Generation Z), O_3 ($\chi2(2) = 18.132$, $p < 0.001$, with a mean rank score of 409.18 for Generation X, 412.91 for Generation Y, 480.53 for Generation Z), O_4 ($\chi2(2) = 21.446$, $p < 0.001$, with a mean rank score of 432.11 for Generation X, 390.57 for Generation Y, 480.24 for Generation Z), O_5 ($\chi2(2) = 10.345$, $p = 0.006$, with a mean rank score of 417.24 for Generation X, 417.28 for Generation Y, 470.12 for Generation Z), O_6 ($\chi2(2) = 9.230$, $p = 0.010$, with a mean rank score of 446.05 for Generation X, 402.19 for Generation Y, 458.81 for Generation Z), and O_8 ($\chi2(2) = 6.433$, $p = 0.040$, with a mean rank score of 407.27 for Generation X, 452.89 for Generation Y, 448.41 for Generation Z). Our data provide strong evidence against the null hypothesis only for some motivators. The p-value is the probability of obtaining an effect at least as extreme as the one in our sample, assuming the null hypothesis is true. The smaller the p-value, the less likely it is that we would observe the effect if the null hypothesis were true, and the more likely it is to reject the null hypothesis. Based on our results, we reject the null hypothesis H0a and accept the alternative hypothesis H1a for O_1, O_3, O_4, O_5, O_6 and O_8. The p-value is less than 0.05, indicating that the observed effect is statistically significant for these motivators. There were no significant differences by motivators O_2, O_7, O_9 and O_10. Our research showed that platforms can adopt different marketing strategies based on the type of motivators.

For pairwise comparisons we used the Post-Hoc Dunn's test using a Bonferroni adjusted alpha (adjusted $\alpha = 0.01667$). As we can see from the Table 3, after adjusting for multiple comparisons using the Bonferroni correction method, the result was not statistically significant for all groups of respondents. We also calculated ε2 (epsilon-squared) to verify effect size of our results. This coefficient does not have any strict intervals, so it is difficult to make clear conclusions. Mangiafico (2016) explained these values as follows: 0.01-<0.08 (small effect), 0.08-<0.26 (medium effect), above 0,26 = large effect). López-Martín & Ardura-Martínez (2023) set up different

intervals: <0.01 (very small effect), 0.01<0.05 (small effect), 0.06<0.13 (moderate effect), >0.14 (large effect), 0.36<0.64 (strong effect), 0.64<1 (very strong effect). As Lakens (2013) emphasized, even small effect sizes can have big impacts.

4.3 RQ3: Reducing Motivators into Motivating Factors

The literature review and our own research showed that there are a number of motivations for entering the sharing economy. Platforms that need to target specific customer segments with their marketing communications need to have information on what motivates which customer segment. We investigated an answer to RQ3 using PCA with varimax rotation. The KMO value was 0.847 and Bartlett's Test of Sphericity was significant (<0.001), indicating the analysis is appropriate. Initial eigenvalues exceeded 1.0 for two components, and were very close to this value for the other two components. For this reason, 4 components were selected for extraction. All communalities were greater than 0.4. We used PCA with varimax rotation and Kaiser normalization. In Table 4 we see the rotated component matrix. We used extraction method Principal Component Analysis and rotation method varimax with Kaiser normalization. Rotation was converged in 8 iterations.

Table 4 shows that the first component consists of motivations O_10, O_11, O_8, O_1, O_9. These are motivations that are somehow related to the financial and non-financial benefits that the owner of the idle asset can gain by entering the sharing economy. Hence, this factor has been termed as opportunistic. The second component consists of the motivations O_6 and O_7. These include motivations that are related to the platform. For this reason, this factor was named as user-related. The third component consists of motivations O_4 and O_2. These include motivations that are related to people. For this reason, this factor was named as social. The fourth component consists of motivations O_5 and O_3. These include motivations that are related to society. For this reason, this factor was named as societal.

To target marketing communications, platforms need to know if factors are relevant to all generations. Factor loadings (regression factor score) for each respondent were used to assess statistical significance and test the validity of hypothesis H0b. We used Welch ANOVA. We also calculated η2 (eta-squared) to verify effect size of our results. We found out interpretation by Richardson (2011). He set up these intervals: small (η2 = 0.01), medium (η2 = 0.06), and large (η2 = 0.14) effects. As Lakens (2013) emphasized, even small effect sizes can have big impacts. The results are captured in Table 5.

Table 4: Rotated Component Matrix – Supply Side

Motivations	Component 1 (Opportunistic)	Component 2 (User-related)	Component 3 (Social)	Component 4 (Societal)
O_10	0.738			
O_11	0.712			
O_8	0.650	0.434		
O_1	0.639		0.409	
O_9	0.557	0.440		
O_6		0.828		
O_7		0.788		
O_4			0.817	
O_2			0.720	0.342
O_5				0.774
O_3				0.746

Source: Own

Table 5: Welch ANOVA – Supply Side

Factor	F	P-value	Significance	η2	Multiple Comparisons (adjusted p-value)		
					X:Y	X:Z	Y:Z
Opportunistic	9.749	<0.001	S	0.024	0.002	<0.001	NS
User-related	1.309	0.271	NS	x	x	x	x
Social	12.221	<0.001	S	0.027	NS	0.003	<0.001
Societal	1.590	0.205	NS	x	x	x	x

Source: Own

Table 5 shows strong evidence against the null hypothesis. A higher F value means significant differences between group means. The p-value is less than 0.05, indicating a statistically significant effect. The smaller the p-value, the more likely it is to reject the null hypothesis. Based on our results, we reject the null hypothesis H0b and accept the alternative hypothesis H1b for the factor named "opportunistic" ($F(2, 870) = 9.749$, $p < 0.001$) and "social" ($F(2, 870) = 12.211$, $p < 0.001$). For platforms, this means that supply-side generational marketing is appropriate to use if the marketing message targets opportunistic factors or social factors. Post hoc comparisons using Bonferroni indicated by opportunistic factor that the regression factor scores differ between generations X (M = -0.2245, SD = 1.1060) and Y (M = 0.0639, SD = 1.0203), lower bound of 95 % confidence interval = -0.4913, upper bound of 95 % confidence interval = -0.0855; and X (M = - 0.2245, SD = 1.1060) and Z (M = 0.1336, SD = 0.8497), lower bound of 95 % confidence interval = -0.5527, upper bound of 95 % confidence interval = -0.1630. Post hoc comparisons using Bonferroni indicated by social factor that the regression factor scores differ between generations X (M = -0.0635, SD = 0.9784) and Z (M = 0.2060, SD = 0.9848), lower bound of 95 % confidence interval = -0.4640, upper bound of 95 % confidence interval = -0.0750; and Y (M = - 0.1813, SD = 0.9990) and Z (M = 0.2060, SD = 0.9848), lower bound of 95 % confidence interval = -0.5812, upper bound of 95 % confidence interval = -0.1934. In contrast, for user-related and social factors, generational marketing is unnecessary, i.e. platforms do not need to distinguish the segment they are targeting with the marketing communication in these cases.

4.4 RQ4: New Motivation Factor

The answer to RQ4 is closely related to the results of the PCA analysis. We found that the new factor can be considered as opportunistic factor. This factor is different from the traditional factors. In fact, none of the authors that we reviewed in our systematic literature review mentioned this factor or its implications for sharing economy motivation. This new factor consists of motivations O_10, O_11, O_8, O_1, O_9. These are motivations that are somehow related to the financial and non-financial benefits that the owner of the idle asset can gain by entering the sharing economy.

4.5 Results Comparison with Other International Results

One of the benefits of generational segmentation is that it can help companies gain a competitive advantage in the market by understanding the needs and preferences of different generations and offering them products and services that match their values and lifestyles (Eastman & Liu, 2012). For example, millennials are more likely to value social responsibility, environmental sustainability, and digital convenience than older generations (Chaney et al., 2017). Therefore, companies that can communicate their social and environmental impact, as well as provide online and mobile platforms for their customers, may have an edge over their competitors in attracting and retaining millennials. P2P platforms that can demonstrate their service excellence, offer personalized communications may have an advantage over their competitors. By using generational segmentation, companies can create more effective marketing strategies that appeal to the specific characteristics of each generation and gain a competitive advantage in the market. Our research focused on three generations: X (born between 1965 and 1980), Y (born between 1981 and 1996), and Z (born after 1997) explained by Dimock (2022). These generations have different characteristics, experiences, and expectations that may influence their attitudes and behaviours toward the sharing economy.

Our first research question (RQ1) aimed to find out what motivations are important on the supply and demand side

in generation perspective. In other international research articles was difficult to find information about motivations on the supply side. Research examining the supply side has been relatively sparse (Rossmannek & Chen, 2023). As a result, supply-side motivations remain an unexplored area (Bucher et al., 2016). Also, studies focusing on supply and demand side together have been relatively sparse. One of the few studies that distinguish between the supply and demand sides suggests a mismatch between the motivations of users of idle assets and their owners to use sharing economy services (Bellotti et al., 2015). In the study by Böcker & Meelen (2017), we find three more motivations (economic, environmental, and social), which the authors examined from a supply and demand perspective concerning the object of the sharing economy (accommodation, car, tool, ride, meal sharing). We didn´t find any generation context in research articles. Further research was needed to continue and expand the knowledge platforms in this area.

In the second research question (RQ2) and third research question (RQ3) we aimed to find out if motivations were dependent on the generation of respondents (RQ2) and if it was possible to reduce the motivations into some motivational factors, especially in generation perspective (RQ3). Other international research articles focused often only on one generation (Alemi et al., 2018; Pham et al., 2021; Ranzini et al., 2017; Sahelices-Pinto et al., 2021; Lee et al., 2019). We can partly compare our result with the research study of Mahadevan (2018), who looked at the motives of Baby Boomers, X and Y generations, among others, and compared how these generations differed from each other on selected motivations. We illustrated the importance of tailoring marketing communication in the sharing economy according to the generational cohorts and the intended message for the supply side of the platform.

The last fourth research question (RQ4) tried to answer if there were other motivation factors that had not been mention before. We could consider "opportunistic factor" as a new motivation factor in the sharing economy. This factor included motivations that are somehow related to the financial and non-financial benefits that the owner of the idle asset can gain by entering the sharing economy. These motivations were clearly opportunistic.

5 Discussion and Conclusions

5.1 Results Comparison with Other International Results

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5.2 Main Findings of the Research

The sharing economy can play a significant role in promoting sustainable development by facilitating the efficient use of resources and minimizing the environmental footprint of consumption. By understanding the varied needs and desires of consumers from different generations, sharing economy platforms can adopt more sustainable business practices that decrease waste, and increase resource efficiency. By integrating environmental considerations into their business strategies, sharing economy platforms can improve their reputation, appeal to eco-conscious consumers, and secure a competitive edge in the marketplace.

The novelty of our research is that, to the best of our knowledge, no author has investigated the effect of three generational cohorts on their motivation to participate in the sharing economy. We know that segmentation by generational cohorts has been shown to be useful in a market economy (Fukuda, 2009). But we lack this confirmation in the sharing economy. While in a market economy a person buys a car with a long-term vision of using it, in a sharing economy a person wants to use a shared car in the short term. Their motivations may differ. Our research in the sharing economy environment is unique. We found that each generation has different supply-side motivators, i.e. each generation may be motivated by a different marketing message. The essence of this research is not only to increase the volume of the shared economy as a tool to increase sustainability, but also to reduce marketing costs by precisely targeting a specific marketing message to a specific generation in the sharing economy. Generational marketing management can therefore be a valuable strategy to improve customer acquisition and retention not only in the market economy, but also in the sharing economy.

Our study sought to put forward workable approaches to help increase the size of the sharing economy. One of the main objectives of this research was to explore the importance of gaining competitive advantage in the sharing economy. Competitive advantage refers to the ability of an organization to create and sustain superior value for its customers and stakeholders relative to its competitors. For practice, it can provide valuable insights for the sharing economy platforms and providers who want to target different generations more effectively and efficiently. P2P platforms can achieve competitive advantage can be achieved by understanding and satisfying the diverse needs and preferences of different generations of consumers who participate in the sharing economy. By doing so, the sharing economy platforms and providers can attract and retain more customers, increase their market share and profitability, and enhance their reputation and social impact. This research can help them to identify the key factors that motivate and influence different generations to engage in the sharing economy, as well as their expectations and preferences for the products and services offered by the sharing economy platforms and providers. By comparing and contrasting the generational differences, this research can also help them to develop and implement more effective and efficient strategies for segmenting, targeting, and positioning their offerings in the sharing economy market. Furthermore, this research can help them to anticipate and respond to the potential challenges and opportunities that may arise from the changing generational dynamics in the sharing economy. For theory, it can contribute to the existing literature on the sharing economy by providing a comprehensive and comparative analysis of the generational differences in the motivators and preferences of sharing economy.

We found out that supply-side generational marketing is appropriate to use if the marketing message targets opportunistic factors or social factors. In contrast, for user-related and social factors, generational marketing is unnecessary, i.e. platforms do not need to distinguish the segment they are targeting with the marketing communication in these cases.

We can see further contributions in that the research addresses the supply side, assessing motivational factors in general, and motivational factors associated with the platform. All this is in a generational context. The generational perspective can help platforms understand the participants in the sharing economy and better tailor marketing communications to a specific generation, considering what motivates that generation to join the sharing economy. Effective marketing creates value for the organization (Garbarski, 2014). Linking this information to other work by the authors of this research, platforms gain additional information on what generation to reach and how to motivate if they need to increase supply in the sharing economy.

5.3 Limitations and Future Research

This research has several limitations that point to areas for further exploration of the motivators of sharing economy participation in a generational context. Firstly, the sample size was relatively small and restricted to a single country, which may limit the applicability of the results. Future studies could use more extensive and varied samples from multiple countries and cultures to investigate

cross-cultural motivational differences in sharing economy. Secondly, the study used self-reported motivation measures, which may be influenced by social desirability bias or memory errors. Future research could employ more objective and behavioural motivation measures to confirm and supplement the self-reported data, such as actual usage data or experiments. Thirdly, while the study examined the main effects of generational cohorts on sharing economy motivators, it did not consider potential moderating or mediating factors that could account for generational differences. Future research could explore other factors, such as personality traits, values, attitudes, or situational variables, that might affect generational cohorts' relationship with sharing economy motivations.

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Preučevanje generacijskih razlik v ekonomiji delitve: razumevanje motivacij lastnikov nedejavnih sredstev in njihov vpliv na upravljanje enakovrednih platform

Ozadje/Namen: Raziskava preučuje dinamiko deljenja nedejavnih sredstev na enakovrednih platformah (P2P) znotraj ekonomije delitve s poudarkom na razumevanju motivacijskih dejavnikov, ki vplivajo na lastnike sredstev med generacijami. Platforme, ki razumejo, kaj motivira lastnike sredstev, da vstopijo v ekonomijo delitve, lahko učinkoviteje vzpostavijo in upravljajo tržno komuniciranje ter pridobijo konkurenčno prednost.
Metode: Uporabljen je bil pristop mešanih metod, ki vključuje kvantitativno in kvalitativno zbiranje ter analizo podatkov. Analitična orodja vključujejo opisno statistiko, Kruskal-Wallisov test, PCA in Welchovo ANOVA.
Rezultati: Identificirani so bili štirje motivacijski dejavniki. Ugotovljeno je bilo, da je generacijsko trženje primerno za tržna sporočila, ki ciljajo na oportunistične dejavnike (popolnoma nove) ali družbene dejavnike. Za uporabniške in družbene dejavnike generacijsko trženje ni potrebno, tj. platformam P2P ni treba razlikovati segmenta, na katerega ciljajo s tržno komunikacijo.
Zaključek: Raziskava razkriva, kako generacijske razlike vplivajo na motivacijo za sodelovanje v ekonomiji delitve, kar pomaga pri upravljanju platform P2P. Ponuja novo primerjalno analizo generacijskih motivatorjev, bogati literaturo o ekonomiji delitve in zagotavlja praktične vpoglede za učinkovito ciljanje na različne generacije. Razumevanje motivacije lastnikov nedejavnih sredstev je ključno za uspešno upravljanje poslovanja platform P2P.

Ključne besede: *Vedenje potrošnikov, Generacije, Management, Trženje, P2P, Delitvena ekonomija*

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The Use of Artificial Intelligence among Students in Higher Education

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Background/Purpose: Artificial intelligence (AI) impacts our everyday lives, from business to social areas, and, in recent years, more and more education. This paper aims to discuss using artificial intelligence tools for educational purposes from the student's perspective.
Methods: A quantitative approach was used for the research using the questioning method. Data were collected using an e-survey. The questionnaire contained closed questions referring to (i) general data, (ii) the use of specific artificial intelligence tools, and open questions (iii) about using artificial intelligence for study purposes. Parametric Independent – Samples t-Test and One-Way ANOVA tests were used for normal and near-normal distributions of the responses.
Results: The study conducted with 258 university students in Slovenia reveals a general familiarity with AI concepts yet with a limited ability to articulate this understanding. Popular AI tools like ChatGPT and Grammarly are predominantly used for information retrieval and idea generation. Notable differences in AI tool usage were observed based on gender and field of study.
Conclusion: The rapid advancement of AI is significantly transforming higher education. Integrating AI into education fosters the development of adaptive, personalized, and inclusive learning environments. Due to the study's limited sample size and geographic focus, further research with more diverse samples is needed to understand global AI tool usage in higher education fully.

Keywords: *Artificial intelligence, AI tools, Higher education, Students, Skills*

1 Introduction

Artificial intelligence (AI) is influencing all areas of our lives today. It is used across various industries and applications, transforming how tasks are performed. It helps to solve complex problems in healthcare, finance, retail, transportation, manufacturing, customer service, marketing, cybersecurity, human resources, legal, and many other areas. Artificial intelligence technology is becoming the basis for business (Barrett et al., 2019). It is developing quickly and has enormously impacted today's world. AI technologies are beneficial not only to the business sector but also to the educational domain. The education community is already trying to find ways to successfully implement AI for staff and students (Barrett et al., 2019). Many authors like Ahmand et al. (2021), Crompton and Burke (2023), Dahri et al. (2023), Chen et al. (2022), Sultana and Faruk (2024), and others have dealt with artificial intelligence in the field of education. Using AI in education goes beyond adopting technologies to facilitate easier learning. It also means reshaping, redesigning, and rethinking traditional education systems' content and methods. AI can be applied in education through three fundamental models (Luckin & Holmes, 2016): pedagogical model (knowledge and expertise of teaching), domain model (knowledge of the subject being learned - domain expertise), and learner

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model (knowledge of the learner). These models were developed to represent emotional, social, and metacognitive aspects of learning in education (Shen et al., 2021).

Many benefits of using AI in education can improve the student's learning (Singh & Mishra, 2023). For example, a significant advantage is personalized education. The current educational system relies on a one-size-fits-all model, but no two people have the same skills. AI can provide a more individualized learning experience and create lesson plans to teach each student effectively. It can also comprehend how a student is learning. AI can identify places where students are struggling and offer them alternate learning strategies. The AI algorithm analyzes students' learning behavior and adapts the course contents to support each student. Then, we have task automation, monitoring, and feedback. AI can help identify grammatical errors, sentence structure problems, and more.

AI methods have also revolutionized teachers' work by helping them track student performance using various tools, including automated grading, learning analytics, and adaptive learning platforms. Automated grading systems offer quick, reliable assessments, saving teachers time and providing timely feedback to students. Learning analytics reveal student behavior and performance patterns, enabling educators to adjust their teaching methods based on these insights. Predictive analytics analyzes historical data to foresee potential challenges, allowing educators to intervene and support students proactively (Chandrasekar, 2023; Kim, 2024; Rensfeldt & Rahm, 2023) Monitoring and feedback will help teachers understand how their students receive education so that they can help them and also see the gaps in the curriculum that need to be filled or improved (Seraydarian, 2021).

Because artificial intelligence is progressing at an accelerated pace in the education domain, we wanted to research how familiar students are with artificial intelligence. Are they familiar with the AI concept? Which AI platforms and tools do they use, and how often? How skilled are they in using them? Do they think using artificial intelligence helps them better understand the study content? Where does artificial intelligence benefit them most in their study? Do they believe that educational institutions should offer training in using artificial intelligence for studying? We also wanted to know if there are differences between students using AI tools regarding gender and the study field.

2 Theoretical Background

The ability to accumulate knowledge and then use it for solving problems is generally termed intelligence. Although contemporary definitions of intelligence vary considerably, experts generally agree that intelligence involves mental abilities such as logic, reasoning, problem-solving, and planning. Specifically, current definitions suggest that intelligence is the ability to learn from experience and recognize and solve problems. The acquisition, retention, and use of knowledge is a vital intelligence component. To use knowledge, one must first identify the issues it might address and then use what he has learned to solve problems (Jaarsveld & Lachmann, 2017).

People are termed as born intelligent. However, machines are created to resolve what is outlined in their programming. Once a machine can show intelligence like any other human being, it is called artificial intelligence (Arora, 2021). Artificial intelligence is the simulation of human intelligence processes by machines, especially computer systems (Laskowski & Tucci, 2023). We can say that artificial intelligence refers to the development of computer systems that can perform tasks that typically require human intelligence. These tasks include learning, reasoning, problem-solving, perception, language understanding, and speech recognition. AI aims to create machines or software that mimic human cognitive functions and sometimes surpass human capabilities.

AI can be categorized into narrow or weak AI and general or strong AI (AGI). Narrow AI is designed and trained for a particular task. It excels in performing specific functions but lacks the broad cognitive abilities of a human. Weak AI is often focused on performing a single task extremely well. While these machines may seem intelligent, they operate under far more constraints and limitations than basic human intelligence (Schroer, 2023). Examples include virtual personal assistants, image and speech recognition systems, and recommendation algorithms. Artificial general intelligence, often portrayed in science fiction, refers to machines that can understand, learn, and apply knowledge across a wide range of tasks at a human level. Like human general intelligence, AGI would have many advantages compared to narrow (limited, weak, specialized) AI. An AGI system would be much more flexible and adaptive. AGI systems also require fewer human interventions to accommodate the various loose ends among partial elements, facets, and perspectives in complex situations (Korteling et al., 2021).

Both narrow AI and AGI concepts have been explored and applied in education, but most practical implementations fall under the narrow AI category. For example, Personalized Learning Platforms (PLP) are AI systems that analyze students' learning patterns and provide customized study materials, exercises, and pacing recommendations. Many authors like Hashim et al. (2023), Farooq et al. (2024), Naseer et al. (2023), and others are exploring personalized learning platforms. All the students have different aptitudes, learning skills, and orientations. With AI's assistance, only content required and suited to the student is delivered (Arora, 2021). Then, we have Intelligent Tutoring Systems (ITS), which use AI to adapt the learning experience based on students' individual needs. They can

provide feedback, answer questions, and guide students through learning. ITS replicates teachers' roles and increasingly automates pedagogical functions (e.g., problem generation, problem selection, and feedback generation) to help create new methods and redefine educational goals (Shen et al., 2021). Lin (2023), Ramadhan (2024), Rybina (2023), and many others are writing about intelligent tutoring systems. Language Processing Applications: Natural Language Processing (NLP) (Campino, 2024; Kaouni, 2024; Wu, 2024) is used in educational tools for tasks like automated grading of essays, language learning apps, and chatbots that assist students with queries. In the education sector, chatbots are also used in different processes like admission, career counseling, etc. (Malik & Solanki, 2021). In Learning Analytics, AI is applied to analyze data generated by students' interactions with digital learning platforms. This information helps educators understand student progress and identify areas needing additional attention.

Many systems, platforms, or tools are available to students, helping them in their educational process. Thinkers on mathematics were designed to help students with any help in math. They relate maths with real-life situations and are also appropriate for kids of a young age. For example, Math Thinker was designed for free for K-12 students to have fun and help in math, but it is also suitable for older students. It was initiated because of the problems during the Covid-19 school shutdowns (https://maththinker.org/about.html). Thinkster Math provides the student with specific issues fitting their scope of capacities and abilities. It upgrades explanations by providing video help (https://hellothinkster.com/). Authors like Casal-Otero et al. (2023), Lane (2023), Wang and Lester (2023), and many others are researching the use of AI in K-12 education.

Some platforms support students' work on a specific text. They help to learn and master content by breaking text down into manageable pieces of information. For example, Cram101's AI technology can turn any textbook into an intelligent study guide complete with chapter summaries, unlimited true-false and multiple-choice practice tests, and flashcards drilled down to a specific book, ISBN, author, and chapter (https://contenttechnologiesinc.com/). JustTheFacts101 highlights and generates text and chapter-specific summaries on the spot. Platforms that check the grammatical correctness of the text, as well as the appropriate formation of whole sentences, are widely used today. For instance, Grammarly instantly generates clear and compelling writing while maintaining the student's unique voice (https://www.grammarly.com/). Platforms like ProWritingAid, Hemingway App, WhiteSmoke, and WordTune, all similar to Grammarly, help students improve spelling, grammar, style, and impact.

Very often used today are chatbots. A chatbot is a software application or web interface designed to mimic human conversation through text or voice interactions. It simulates a human conversation with an end user. Though not all chatbots are equipped with artificial intelligence, modern chatbots increasingly use conversational AI techniques like natural language processing (NLP) to understand the user's questions and automate responses (IBM, 2023). ChatGPT is a very well-known chatbot today, developed by OpenAI. Many authors like Garrel and Mayer (2023), Bhullar et al. (2024), Korseberg and Elken (2024), Jensen et al. (2024), Rawas (2024) and others are researching the use of ChatGPT in education. Based on a large language model, it enables users to refine and steer a conversation towards a desired length, format, style, level of detail, and language. Similar to it is Bing, a web search engine owned and operated by Microsoft. Bard is a conversational generative artificial intelligence chatbot developed by Google, based initially on the LaMDA (Language Model for Dialogue Applications), PaLM, (Pathways Language Model), and Gemini families of large language models. Many others exist, such as Jasper Chat, Claude 2, Llama 2, HuggingChat, etc. Also well-known is PerplexityAI, a user interface strategy similar to ChatGPT, but it is less a chatbot and more of a search bot. It closely resembles the Google search engine in its layout and includes a prominent central search bar where users can input their questions to the AI.

Brainly is the knowledge-sharing community where hundreds of millions of students and experts put their heads together to crack their most challenging tasks (https://brainly.com/). Mika is a personalized virtual tutor that easily adapts to student's needs and provides real-time feedback to help them learn more effectively. SmartEd allows students to easily customize learning materials such as textbooks to the student's learning style and needs. It also has gamification features that make learning more engaging and fun (Seraydarian, 2021).

3 Method

3.1 Sample

The study sample consisted of 258 students from randomly selected faculties of universities in Slovenia. Fourteen did not answer the general questions about gender and study level. Of the 244, 46.3 % were male and 53.7 % were female; 65.6 % were undergraduate and 34.4 % postgraduate students. Sixteen did not answer the general questions about the study field. Of the 242 students, 55.4% were social science students, 12.4 % were natural science students, and 32.2 % were technical sciences students (for more details, see Table 1).

Table 1: Frequency distributions of the study variables (n=258)

		Frequency	Percent	Valid percent
Gender	Male	113	43.8	46.3
	Female	131	50.8	53.7
	Missing	14	5.4	
Study level	Bachelor	160	62	65.6
	Masters	84	32.6	34.4
	Missing	14	5.4	
Study field	Social sciences	134	51.9	55.4
	Natural sciences	30	11.6	12.4
	Technical sciences	78	30.2	32.2
	Missing	16	6.2	

3.2 Questionnaire and Procedure

The questionnaire contained closed questions referring to (i) general data (gender, level of study, and field of study), (ii) the use of specific artificial intelligence tools, and open questions (iii) about using artificial intelligence for study purposes.

The frequency of using specific AI tools was measured on a 5-point Likert-type scale. Students were asked to choose from "1=Never", "2=Rarely", "3=Medium often", "4=Often", and "5=Very often". The answers regarding the helpfulness of using the AI tools in different areas of their studies were measured on a 5-point Likert-type scale. Students were asked to choose from "1=Not helpful", "2=A little helpful", "3=Partially helpful", "4=Helpful", and "5=Very helpful".

The skills in using AI tools were measured on a 5-point Likert-type scale from "1= Not very skilled", "2=A little skilled", "3=Partially skilled", "4=Skilled", and "5=Very skilled". Students were asked to rate their level of satisfaction with the use of AI tools on a 5-point Likert-type scale from "1= Dissatisfied", "2=Not too pleased", "3=Satisfied", "4=Very satisfied", and "5= Excited".

The online questionnaire was presented to students by professors during lectures and tutorials. Participation in this research was voluntary and anonymous.

All statistical tests were performed with SPSS 27. Parametric Independent – Samples t-Test and One-Way ANOVA tests were used for normal and near-normal distributions of the responses.

4 Results

The first set of questions concerns general knowledge about artificial intelligence. We asked students if they had heard of the term artificial intelligence, were familiar with the basic concepts of AI, and had ever encountered tools using AI. 255 (99.2 %) students had already heard of the term AI, and 2 (0.8 %) had not. 229 (88.8 %) answered that they know the basic concepts of AI, and 29 (11.2 %) that they do not. 229 (88.8 %) had encountered using tools or apps that involve artificial intelligence, thirteen (5 %) did not, and 16 (6.2 %) did not know if they had (Table 2).

We also wanted to know if there are differences between students using AI tools regarding gender and the study field. First, we tested if there are any differences between males and females regarding knowing the concepts of artificial intelligence. No statistically significant differences were found ($t = -1.459$ and $p = 0.146$). There were also no statistically significant differences between students of different study fields regarding knowing the concepts of artificial intelligence ($F = 2.429$ and $p = 0.090$).

The second set of questions concerns the use of artificial intelligence tools. First, we asked students if they use apps or tools, including artificial intelligence, for study (learning) purposes. Within this question, we also asked them to skip the next set of questions if the answer was no. Two hundred fifty students answered this question, where 187 (75 %) use AI tools for study purposes, and 63 (25 %) do not. Of 185 students who answered the next question, 43 (23 %) use AI tools rarely, 81 (44 %) use AI several times a month, 44 (24 %) several times a week, and 17 (9 %) use AI tools almost every day (Figure 1). Two students didn't answer. We tested if there were any differences between males and females regarding the frequency of using AI tools. No statistically significant differences were found ($t = 1.796$ and $p = 0.074$). There were also no statistically significant differences between students of different study fields regarding the frequency of using AI tools ($F = 2.520$ and $p = 0.083$).

Table 2: Descriptive statistics for the first set of questions

	Yes			No		Do not know	
Question	N	Freq.	Percent	Freq.	Percent	Freq.	Percent
Have you heard of the term artificial intelligence?	257	255	99.2	2	0.8	/	/
Are you familiar with the basic concepts of artificial intelligence?	258	229	88.8	29	11.2	/	/
Have you ever encountered using apps or tools that involve AI?	258	229	88.8	13	5.0	16	6.2

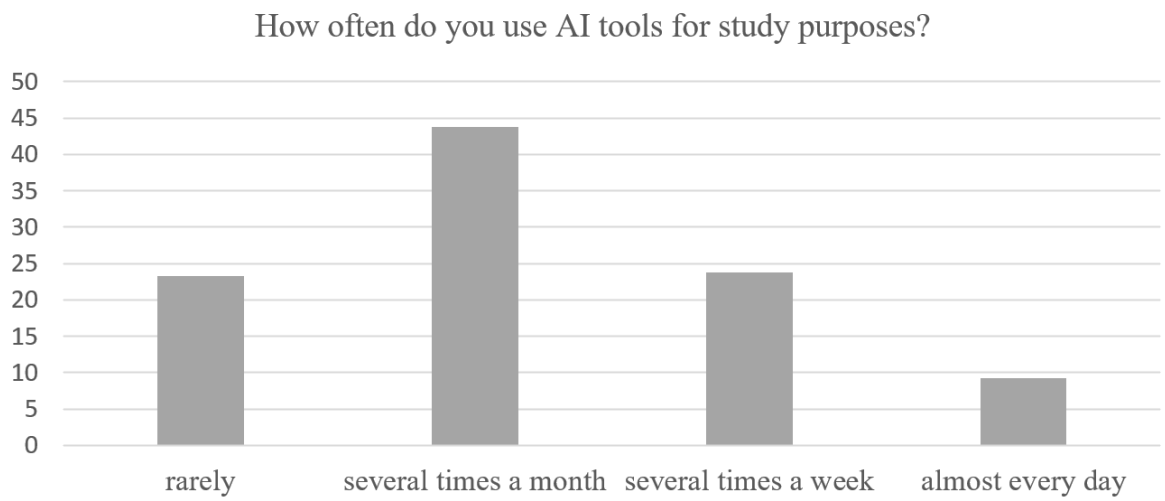

Figure 1: The use of AI tools for study purposes in percentage

Next, we asked them which AI tools they use and how often. The results can be seen in Table 3. Of all the tools, students use ChatGPT and Grammarly the most. Some students also use other AI tools, but rarely. These tools are MS Bing, Perplexity AI, Google Bard, Jasper Chat, ChatSonic, Claude 2, Llama 2, HuggingChat, ProWtitingAid, Hemingway App, WordTune, and Midjourney.

Since ChatGPT and Grammarly were the tools used most often among students, we tested if there were any significant differences between males and females and students of different study fields. No statistically significant differences were found between genders (ChatGPT: T = -0.350 and p = 0.727; Grammarly: t = 0.460 and p = 0.646) and between students of various study fields (ChatGPT: F = 0.180 and p = 0.836; Grammarly: F = 1.134 and p = 0.324).

The next question addressed using payable or free AI tools. One hundred eighty-six students answered the question, 161 (86.6 %) use only free AI tools, 24 (12.9 %) use both free and payable AI tools, and one student uses only payable AI tools. We found statistically significant differences between genders regarding using both payable and free AI tools (t = 3.183 and p = 0.002). Males (M = 0.2093 and SD = 0.4092) are more likely to use payable and free AI tools than females (M = 0.015 and SD = 0.2223). We also found statistically significant differences between genders regarding using only free AI tools (t = -2.919+ and p = 0.004). Females (M = 0.9381 and SD = 0.2421) are likelier to use only free AI tools than males (M = 0.7907 and SD = 0.4092). We found statistically significant differences between technical and social students using payable and free AI tools. The Games-Howell test showed that students from the technical field are more likely to use payable and free AI tools than students from the social field (Sig = 0.016). Students from the social field are more likely to use only free AI tools than technical students (Sig = 0.031). No statistically significant differences were found between students from the social and natural fields and students from the technical and natural fields regarding using payable or free AI tools.

Table 3: Descriptive statistics for the use of AI tools (Mean and Std. Deviation)

	Never	Rarely	Medium often	Often	Very often	N	Mean	Std. deviation
ChatGPT	6 (3%)	34 (18%)	51 (28%)	54 (29%)	40 (22%)	185	3.5	1.1
MS Bing	149 (84%)	11 (6%)	10 (6%)	3 (2%)	4 (2%)	177	1.3	0.8
Perplexity AI	155 (88%)	13 (7%)	6 (3%)	2 (1%)	1 (1%)	177	1.2	0.6
Google Bard	148 (84%)	21 (12%)	5 (3%)	2 (1%)	0 (0%)	176	1.2	0.5
Jasper Chat	166 (94%)	7 (4%)	2 (1%)	0 (0%)	1 (1%)	176	1.1	0.4
ChatSonic	166 (95%)	5 (3%)	3 (2%)	0 (0%)	1 (1%)	175	1.1	0.4
Claude 2	164 (95%)	5 (3%)	2 (1%)	1 (1%)	1 (1%)	173	1.1	0.5
Llama 2	171 (98%)	3 (2%)	1 (1%)	0 (0%)	0 (0%)	175	1	0.2
HuggingChat	170 (98%)	3 (2%)	0 (0%)	0 (0%)	0 (0%)	173	1	0.1
Grammarly	86 (49%)	34 (19%)	23 (13%)	26 (15%)	6 (3%)	175	2	1.2
ProWritingAid	165 (96%)	4 (2%)	2 (1%)	0 (0%)	0 (0%)	171	1	0.3
Hemingway App	168 (98%)	3 (2%)	1 (1%)	0 (0%)	0 (0%)	172	1	0.2
WhiteSmoke	169 (98%)	2 (1%)	1 (1%)	0 (0%)	0 (0%)	172	1	0.2
WordTune	161 (95%)	6 (4%)	2 (1%)	0 (0%)	0 (0%)	169	1.1	0.3
Midjourney	157 (92%)	7 (4%)	3 (2%)	2 (1%)	2 (1%)	171	1.2	0.6

1=Never, 2=Rarely, 3=Medium often, 4=Often, and 5=Very often

Table 4: Descriptive statistics for skills in using AI tools

How skilled are you in using AI tools?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not very skilled	25	9,7	13,4	13,4
	A little skilled	50	19,4	26,9	40,3
	Partially skilled	71	27,5	38,2	78,5
	Skilled	34	13,2	18,3	96,8
	Very skilled	6	2,3	3,2	100,0
	Total	186	72,1	100,0	
Missing	Prekinjeno	8	3,1		
	Leap (if)	64	24,8		
	Total	72	27,9		
Total		258	100,0		

We also asked students how skilled they are using AI tools. We can see that most students (56.5 %) are partially skilled or skilled in using AI tools. More details can be seen in Table 4. The mean value for the above question is 2.71, with a standard deviation of 1.020. We found statistically significant differences regarding skills of using AI tools between genders ($t = 3.881$ and $p < 0.001$) and also between students of various study fields ($F = 6.605$ and $p = 0.002$). Males ($M = 3.01$ and $SD = 1.035$) are more skilled in using AI tools than females ($M = 2.44$ and $SD = 0.946$). Most skilled in using AI tools are students from the technical field ($M = 3.02$ and $SD = 0.976$), then students from the natural field ($M = 2.88$ and $SD = 0.993$), and the least skilled are students from the social field ($M = 2.44$ and $SD = 1.018$).

The next question addressed satisfaction with using AI tools for study purposes. Of 186 students, 20 (10.8 %) are excited about using AI tools, 33 (17.7 %) are very satisfied, 120 (64.5 %) are satisfied, 12 (6.5 %) are not too pleased, and one is dissatisfied. We can see that the majority of students are satisfied or even more. The mean value regarding satisfaction with using AI is 3.32, with a standard deviation of 0.772. We found no statistically significant differences regarding satisfaction with using AI tools for study purposes between genders ($t = 1.562$ and $p = 1.120$) and between students of various study fields ($F = 0.203$ and $p = 0.817$).

Next, we wanted to know where the AI benefits them most in their study. The results can be seen in Table 5. We can see that the areas where AI tools help students the most are searching for information ($M = 3.8$ and $SD = 1.1$) and generating ideas ($M = 3.6$ and $SD = 1.1$).

Statistically significant differences between genders were revealed only for generating ideas ($t = -2.325$ and $p = 0.021$). There were no statistically significant differences between students of various study fields regarding the areas where using AI tools benefits them. However, we found statistically significant differences between undergraduate and postgraduate students regarding faster learning ($t = 2.218$ and $p = 0.014$) and task solving ($t = 1.998$ and $p = 0.047$). Undergraduate students find AI tools more helpful for faster learning ($M = 3.4$ and $SD = 1.076$) than postgraduate students ($M = 2.95$ and $SD = 1.371$). Undergraduate students also find AI tools more helpful for task solving ($M = 3.01$ and $SD = 1.185$) than postgraduate students ($M = 2.63$ and $SD = 1.139$).

We also asked them if they think using artificial intelligence helps them better understand the study content. Of 183 students, 158 (86.3 %) think AI helps them better understand the study content, and 25 (13.7 %) do not.

The third and last set of questions concerns the issue of involving artificial intelligence tools in the educational process. The questions and answers can be seen in Table 6.

5 Discussion

Most students reported familiarity with AI concepts, which aligns with AI's growing awareness and integration into various aspects of society. However, their ability to articulate this understanding in their own words was limited. The best explanation, in the words of a student, was "a software tool that "takes" data from a wide database, according to our "requirements."". Students' statements about missing "a single AI that can use text and images and can take a picture of text and have it automatically written" or "AI tools for simplifying very general and broad topics, so there's no need to search for information and read entire books or articles" indicate that some are unfamiliar with AI tools and their capabilities.

Table 5: Descriptive statistics of areas where using AI tools benefits students

	Not helpful	A little helpful	Partially helpful	Helpful	Very helpful	N	Mean	Std. deviation
Faster Learning	18 (10%)	31 (17%)	55 (30%)	48 (26%)	31 (17%)	183	3.2	1.2
Generating ideas	6 (3%)	20 (11%)	51 (28%)	62 (34%)	42 (23%)	181	3.6	1.1
Writing seminar papers	17 (9%)	45 (25%)	63 (35%)	31 (17%)	25 (14%)	181	3	1.2
Searching for information	8 (4%)	9 (5%)	48 (26%)	65 (35%)	54 (29%)	184	3.8	1.1
Explanation of material	16 (9%)	33 (18%)	53 (29%)	46 (25%)	35 (19%)	183	3.3	1.2
Tasks solving	25 (14%)	43 (24%)	62 (34%)	28 (15%)	23 (13%)	181	2.9	1.2
Problem-solving	15 (8%)	39 (21%)	65 (36%)	38 (21%)	25 (14%)	182	3.1	1.1

Table 6: Descriptive statistics for the third set of questions

Yes				No		Do not know	
Question	N	Freq.	Percent	Freq.	Percent	Freq.	Percent
Do you think using artificial intelligence positively affects the quality of your study?	185	156	84.3	29	15.7	/	/
Do you think that artificial intelligence will be even more involved in educational processes in the future?	184	169	91.8	3	1.6	12	6.5
Do you think students should learn more about how artificial intelligence works during their studies?	184	155	84.2	11	6.0	18	9.8
Do you think that educational institutions should offer training in the field of using artificial intelligence for studying?	183	146	79.8	16	8.7	21	11.5

ChatGPT and Grammarly emerged as the most frequently used AI tools, which resonates with broader trends. Natural language processing tools and writing assistance applications are widely adopted due to their versatility and direct relevance to academic tasks. A few students listed to the majority lesser-known AI tools like Kapwing, a known online video editing platform. It has gained popularity, especially among users who seek easy-to-use tools for creating and editing multimedia content. Next was DALL-E, an AI model OpenAI developed that generates images from textual descriptions. It gained significant attention due to its ability to create unique and imaginative images based on user prompts. However, it may not be as widely used by the general public as some more consumer-oriented applications. Students also mentioned they use the Orange Data Mining AI tool, an open-source data visualization and analysis tool. It is known in the data science and machine learning communities for its user-friendly interface and versatility. It's famous for educational purposes and exploratory data analysis. Some students also use rewriting AI tools or services with text-rewriting capabilities for academic purposes. They did not reveal which ones.

The study identified differences in using payable AI tools and skills based on gender. Males are likelier to use payable and free AI tools than females. While this aligns with the general acknowledgment of gender gaps in technology adoption, the extent of these differences may vary across different studies and cultural contexts. Students from the technical field are more likely to use payable and free AI tools than students from the social field. Technical science students showing a higher propensity to use also payable AI tools and demonstrating greater proficiency align with the expectation that specific disciplines might engage more deeply with AI technologies.

Students' moderate level of skills in using AI tools is consistent with the learning curve associated with adopting new technologies (Zehng et al., 2021; Sumakul et al., 2022; Coffey, 2023; Salido, 2023). Further studies might delve into the specific skills students find challenging or proficient in using AI tools.

The predominant use of AI tools among students was for information retrieval and idea generation. The perceived benefits of AI tools in faster learning, idea generation, and information retrieval are also discussed by authors like Delcker et al. (2024), Bello (2024) and others. Students also use AI tools for writing seminar papers, task-solving, problem-solving, material simplification, and a more straightforward understanding of matter and tasks. One student wrote he uses AI tools for reading and generating poetry.

Most students express satisfaction and excitement with AI tool usage, which aligns with the generally positive attitude towards technology adoption in education. However, specific factors contributing to satisfaction may vary and could be explored further.

The anticipation of increased AI involvement in educational processes aligns with the overall trajectory of AI adoption in education globally. Education with the help of artificial intelligence is most developed in several countries, each focusing on different aspects of AI integration in education. Notable countries leading in AI education are the United States, China, Singapore, South Korea, Finland, Spain, Japan, Sweden, and Luxembourg (Baker, 2017; Lake, 2023; Basheer, 2024; Hanks, 2024). In terms of specific fields, AI is being used broadly across various educational domains, including (STEM) science, technology, engineering, mathematics, robotics, language learning, special education, and administrative efficiency

(World Economic Forum, 2024; Baker, 2017; Lake, 2023; Hanks, 2024).

Studies often reflect an awareness of the evolving role of AI in shaping educational practices. Most students supporting the incorporation of AI training into educational curricula are consistent with recognizing AI as a crucial skill set for future professionals. This aligns with the broader discourse on preparing students for the AI-driven workforce.

Students stated that since there are many valuable artificial intelligence tools, they should learn to use as many AI tools as possible at the faculty. They want to involve artificial intelligence more in their studies and use it to assist them in various projects they must complete at faculties. They want to learn how to use artificial intelligence most skillfully. They think it would improve the quality of learning and reduce the time needed for specific tasks related to the study purposes. One student stated, "Instead of suppressing the use of AI, we should use it to our advantage, such as obtaining key data." Another statement was, "It would be excellent if we could use artificial intelligence without getting into trouble."

Some students miss easier fact-checking, like citing sources in responses, which would enable the checking. They miss better guidance on sources when searching for relevant professional literature. Although that, this is already possible with specific AI tools such as Perplexity. They would like to know "how to best obtain as accurate information as possible from artificial intelligence since it often happens that it does not provide accurate information or does not 'understand' what they need and gives completely wrong answers." Students also miss better AI tools for solving mathematical problems, better assistance in programming, and better and more accurate information. They state "most AI tools cannot solve and explain more challenging tasks. For example, ChatGPT often solves computational tasks incorrectly."

Many students see AI as a valuable asset for performing different tasks and know that AI doesn't replace humans. Many authors like Harding (2023), Hong (2024), Brusilovsky (2024), Eisbach et al. (2024), Spillias et al. (2024), and others also support these findings. On the other hand, some authors discuss the possibility and implications of artificial intelligence replacing humans. Roos (2023) highlights various professions where AI could replace humans, including graphic designers, data analysts, programmers, and warehouse workers. Talmage-Rostron (2024) discusses how AI impacts receptionists, accountants, and salespeople jobs. AI systems are already performing tasks that range from managing reception duties to automating bookkeeping and sales processes, which raises concerns about the future need for human workers in these roles. ScienceDaily (2023) reports on the University of Waterloo's findings that AI could replace humans in social science research. AI's ability to process and analyze large datasets efficiently suggests it could handle tasks traditionally performed by human researchers.

They know that AI contributes only a part in making it easier and faster for humans to perform tasks. One student stated, "I firmly believe that we must make an effort for everything ourselves, and artificial intelligence can only serve as assistance, as Google did initially, significantly easing everything for us." One other said, "It would be right for people to be acquainted with artificial intelligence and use it for assistance, not exploitation." Students are aware that some students are exploiting AI tools with minimal effort to perform different tasks regarding study.

Based on the results and students' statements, we suggest that educational institutions should offer training in using AI for studying purposes.

6 Conclusion

Artificial intelligence is progressing at an accelerated pace, which already impacts the profound nature of higher education (Popenici & Kerr, 2017). The application of artificial intelligence to education has been the subject of academic research for many years. Jia et al. (2024) try to fill a gap in the current review of research on AI in science education (AISE) in the early stage of education by systematically reviewing existing research in this area. Different researches are centred on various educational levels, fields, and contexts. For example, Xu and Ouyang (2022) are discussing STEM education (science, technology, engineering, mathematics), Liang et al. (2021) language education, Drigas and Ioannidou (2013) special education, etc. The field investigates learning wherever it occurs, in traditional classrooms or workplaces, to support formal education and lifelong learning. It brings together AI, which is itself interdisciplinary, and the learning sciences (education, psychology, neuroscience, linguistics, sociology, and anthropology) to promote the development of adaptive learning environments and other AI tools that are flexible, inclusive, personalized, engaging, and effective.

The article discusses using AI tools for educational purposes from the perspective of students in higher education. Two hundred fifty-eight students from different faculties of universities in Slovenia participated in the study. The findings indicate that while most students reported familiarity with AI concepts, their ability to articulate this understanding in their own words was limited. ChatGPT and Grammarly emerged as the most frequently used AI tools. The predominant use of AI tools among students was for information retrieval and idea generation. The study also unveiled some statistically important differences in using AI tools based on gender and field of study. The study's limitation is the sample size of 258 students from university faculties in Slovenia. The study's findings may also not be generalized to a larger population because they are

focused on students from a specific geographic location and may not capture the full diversity of AI tool usage and familiarity among students in higher education globally. Further research with a more extensive and diverse sample and objective measures of AI tool usage and skills could provide a more comprehensive understanding of the use of AI tools among students in higher education.

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Uporaba umetne inteligence med študenti v visokem šolstvu

Ozadje/Namen: Umetna inteligenca (UI) ima vpliv na naše vsakdanje življenje, od poslovnih do družbenih področij, in v zadnjih letih vse bolj tudi na izobraževanje. Namen prispevka je dobiti vpogled v uporabo orodij umetne inteligence za izobraževalne namene iz perspektive študentov.
Metode: Za raziskavo je bil uporabljen kvantitativni pristop z metodo anketiranja. Podatki so bili zbrani z e-anketo. Vprašalnik je vseboval zaprta vprašanja, ki so se nanašala na (i) splošne podatke, (ii) uporabo specifičnih orodij umetne inteligence, in odprta vprašanja (iii) o uporabi umetne inteligence za študijske namene. Za normalne in skoraj normalne porazdelitve odgovorov so bili uporabljeni parametrični t-test za neodvisne vzorce in enosmerna analiza variance (ANOVA).
Rezultati: Študija, izvedena med 258 študenti v Sloveniji, razkriva splošno seznanjenost s koncepti UI, vendar z omejeno sposobnostjo artikulacije tega razumevanja. Priljubljena orodja UI, kot sta ChatGPT in Grammarly, se pretežno uporabljajo za iskanje informacij in generiranje idej. Pokazale so se določene razlike v uporabi orodij UI glede na spol in področje študija.
Zaključek: Hiter napredek UI pomembno spreminja visokošolsko izobraževanje. Integracija UI v izobraževanje spodbuja razvoj prilagodljivih, personaliziranih in inkluzivnih učnih okolij. Zaradi omejene velikosti vzorca in geografske osredotočenosti študije so potrebne nadaljnje raziskave z bolj raznolikimi vzorci, da bi v celoti razumeli uporabo orodij UI v visokem šolstvu na globalni ravni.

Ključne besede: *Umetna inteligenca, Orodja UI, Visoko šolstvo, Študenti, Veščine*

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Multilevel Investigation of Leadership Prototype Perception: Political Behavior in Relation to Effectiveness and Trust

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Background/Purpose: Empirical evidence suggests that a leader's political skills may act as a moderator that might decrease the effect of prototypicality's impact on trust and on leadership effectiveness. The study investigated leading political skills as second-level regulatory variables in connection to leader effectiveness and trust with the purpose of testing a cross-level moderated mediation model within a traditionally collectivist culture like Turkey in efforts to contextualize and expand understanding of leadership prototype perception.
Methods: A total of 442 service sector employees and 28 executive managers were interviewed. Two surveys in two separate time periods were conducted. Multilevel path analysis was used to evaluate the hypotheses.
Results: The findings suggest that there is a strong and significant impact of leader prototypicality on leadership effectiveness and a direct impact on trust. Results indicate that leaders who are trusted by their subordinates are perceived as more effective in their leadership roles. Lower levels of trust from subordinates are negatively associated with leader effectiveness.
Conclusion: If leaders cannot provide their followers a contextualized sense of empowerment and development, they are perceived to not provide high levels of emotional trust. Therefore, there is greater need for multilevel contextualized studies taking account of collective, two-sided, embedded experiences within groups.

Keywords: *Leader political behavior, Political skills, Leader effectiveness, Trust, Social identity theory, Turkiye*

1 Introduction

The volatile and unpredictable conditions of today's complex world expose businesses to deal with increasingly difficult conditions. These challenging circumstances require effective leaders (Hasel 2013), and effective leadership in return requires the ability to create trust-based relationships (Colquitt et al. 2007). Leadership skills such as persuasion and negotiation along with being frank, and the ability to use social relationships with skill are effective in achieving leadership goals and developing the trust in doing so (Ferris et al. 2005). Moreover, leaders who are effective in understanding others within the organization, and influencing them while aligning personal or organizational goals in accordance stand out as resourceful leaders. This carries connotations of being political in one's

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leadership (Hochwarter et al. 2020). In some studies, it is reported that leaders who can successfully maintain political maneuvers appear to be effective leaders and these behaviors can sometimes result in a positive favoring the organization and its employees (Hochwarter 2012; Ellen III 2014; Kapoutsis and Thanos 2016; Hochwarter et al. 2020). However, leadership literature has often conceptualized political leadership behavior as self-serving and as productivity-hindering negative behaviors. These conceptualizations out way the positive outcomes and have caused negative perceptions (Hochwarter et al. 2020). Yet, organizations by nature are political arenas (Mintzberg, 1985 as cited in Ferris et al. 2005), in which factors such as sharing of scarce resources within the organization, degrees of centralization and formalization are organic issues that need to be led (Ellen III et al. 2013). Therefore, political skills carry weight in achieving organizational goals and should be viewed as a resourceful skill rather than a negative expression (Hochwarter et al. 2020).

Drawing from implicit leadership and social identity theory, our research assumes that positive thoughts about the leader's effectiveness can be formed through the perception of trust in the leader. Leadership prototype schemes are formed in the cognitive schemes of employees that show the characteristics of leadership within their organizations (Giessner et al. 2009). It is possible to see the effect of leadership prototypes largely determined by this cognitive affinity in the formation of a perception of trust in the leader (Barth-Farkas and Vera 2019). In addition, the perception of the leader prototype can be influenced by the political skills of the leader, which can further increase perceptions. Therefore, it may have a positive effect on the confidence of the leader. In fact, the same regulatory variable model used in this study had previously been used by Giessner et al. (2009). Similarly, the relationship between leadership prototypicality and leadership effectiveness has been the subject of previous research.

In this study, mutual data from both employees and the leaders of these employees is collected and examined. The sample consists of service sector employees and managers in Ankara, the capital of Turkey, and the surrounding provinces and districts. Unlike the Giessner et al. (2009) study, we have modeled leading political skills as second-level regulatory variables and created a cross-level moderated mediation model. We tested whether the model also works in a collectivist culture like Turkey (see Hofstede 1980, 2011), in which a leader's political skills may act as a moderator that might decrease the effect of prototypicality's impact on trust and on leadership effectiveness. Within the framework of organizational management, we conceptualize political behavior used to describe the behavior of individuals in order to have, develop and use power and other necessary resources to achieve desired results in uncertain or conflictive situations. We acknowledge that political leaders often involve tactics outside of formal processes, such as persuasion, negotiation, coalition building, and leveraging social networks. With this said, to a larger extent, many studies have focused on the perception of managers' political behavior of employees (e.g., Mehmood et al. 2019; Landells and Albrecht 2019; Hochwarter et al. 2020) without examining both the sense of trust in the leader and the role of the mediator. To fill this gap, a scale of trust was used to measure leader's cognitive and emotional dimensions that are thought to be compatible with social identity theory. Within the framework of the propositions of social identity theory, it is suggested that the leading prototypes formed in the cognitive schemes of individuals reflect the values and norms of the organization, which can build trust in the leader (Hogg 2001; Barth-Farkas and Vera 2019). Moreover, in a collectivist society like Turkey, leadership usually entails social cohesion and compliance; in individualistic societies, it may give autonomy and personal success top priority (Hofstede, 2011). Understanding these cultural subtleties is crucial as they affect the impression of political actions and leadership models, therefore affecting trust and efficacy. This study investigates these dynamics in the Turkish environment, offering insights that could have more general relevance for leadership in cultural environments. The study is important in three respects and provides the following contributions to the relevant literature: (1) Contributing to the research stream positive aspects of leader political skills, such as whether it increases confidence or not. Here, the perception of effective leadership may be due to the perception of the leader prototype rather than the leadership behavior (Mahon and Greenwald 2018). (2) Combining two points of view within the literature, leadership effectiveness and leadership political behavior, that are seen as contradictory and studied as serving opposite sides. A lack of multilevel studies, as argued by Mahon and Greenwald (2018) state that the perception of the leading prototype if well understood by organizations, can have many positive contributions for employees, from the quality of leader-member interaction to being good at work. Claiming that this may be overcome with more studies exploring leadership effectiveness and political leadership skills together as a resource for leadership development. (3) Clearing the vagueness in relation to the argument regarding the perception of leadership within a group by using a multilevel model that permits evaluating within- and between-level variance. Currently, many studies within organizational sciences have evaluated the effects of political constructs at the individual level (Ferris et al. 2019), whereas the use of aggregation and multilevel modeling will allow the means to better evaluate the collective, dyadic, nested, and within-person effects that have been sparse within the literature.

In the following section, we outline a brief review of the literature on social identity theory, leader prototype, the role of trust in the leader, and political leader behavior and skills as we develop the theoretical foundation. Next,

we describe the methodology used, followed by the findings. In the discussion section we discuss the theoretical implications and contributions of our findings. Lastly, we wrap up with a brief conclusions section and describe some limitations of our study.

2 Literature Review and Hypotheses

2.1 Social Identity Theory

Leadership is about how some individuals or cliques have disproportionate power and influence to set an agenda, define identity, and mobilize people to achieve collective goals (Hogg 2001). However, activity and performance in social contexts such as organizations can increase based on the dynamic interaction of the leader and its members (van Knippenberg 2011). Only personal characteristics of leaders or only social or situational factors alone will be inadequate in achieving effectiveness (Halevy et al. 2011). Tajfel (1972) introduced the idea of social identity to theorize how people conceptualize themselves in intergroup contexts, how a system of social categorizations "creates and defines an individual's own place in society" (p. 293). He defined social identity as "the individual's knowledge that he belongs to certain social groups together with some emotional and value significance to him of this group membership" (Tajfel 1972: 292). When examining the determinants of the leader's effectiveness, it has been revealed in many studies that social identity formation occurs through multilateral and dynamic processes (Hogg 2001), based on social categorization and prototypes within groups. Within the framework of SIT, it is suggested that leadership is shaped by dynamic interactions between leaders and followers (Hogg 2001). Due to the direct and indirect influence of the group on the individual, it is also reported that individuals adapt cognitively and behaviorally to the dominant identity characteristics formed in the group (van Knippenberg 2011). This process can occur as a result of the strengthening process of leader over time, depending on their personal characteristics or as a result of the proactive behavior of the leader. However, the influence of the leader alone is not enough in this interaction. Influence must also mobilize followers and begin to support the status and power of their leaders (Fiske and Depret 1996). The leader's creativity and particular behaviors, and their acceptance by followers' affect how much the leader can push the boundaries (idiosyncrasy credit) depending on the group norms (Hogg 2001).

Within the extant literature, it can be seen that this interactive process is initiated by the leader's charismatic, innovative perspective with vision and mission. Hence, followers are also influenced by the leader, strengthening this process and therefore the status of the leader (Guillen et al. 2015, Greenberg et al. 2007). It is also claimed that followers develop leadership behavior schemes specific to their group through their past experiences and interactions within the group (Ridgeway 2001). It is within the framework of these schemes that employees act according to the norms of the group they are in, they create expectations about the behavior of leaders (Hogg 2001; Ibarra et al. 2010). However, social identity plays a guiding role in the behavior of followers and also leads the organization to prioritize its interests (van Knippenberg 2011). In this context, this research model has been formed by considering that the leaders who behave in accordance with the norms of the group will gain the trust of the employees and will be supported and thus carry out their duties effectively. According to this theoretical model, it is suggested that the perception of the leader prototype shaped in the followers can be considered as "one of us" (Lord and Hall 2003:57) and this interaction can create a sense of trust in the leader over time. Through this sense of trust, it is estimated that the leader's perceptions of his effectiveness would increase. In addition, in this relationship, it is thought that the leader can make a positive contribution to the effect of the leader prototype by showing political behavior skills in accordance with the norms of the group and thus increase the level of trust.

2.2 Leader Prototype

Today, when we look at the studies that deal with the dynamics of leadership, we see that the leader emphasizes interaction within the group more (van Knippenberg 2011). It is revealed in studies that successful leaders have high interaction within the group, and that high interaction shows compliance with group norms (Mahon and Greenwald 2018; Barth-Farkas and Vera 2019). Therefore, success of leaders in adapting to group norms, may bring about effectiveness of the leader and organization (Barth-Farkas and Vera 2019).

Indeed, leadership behaviors in accordance with group norms form the basis of the ideal leader prototype perception in employees and are used as the main criterion for positioning the leader (Jacquart and Antonakis 2015). The leader prototype reflects the characteristics of the schemes formed in the followers, and develops in accordance with the norms of the group (organization). (van Knippenberg 2011). Leaders who act in accordance with the norms of the organization and the schemes of the followers form the ideal leader prototype, which shapes the attitudes and behaviors of the employees towards the leader and the organization (Giessner et al. 2009). Leaders who reflect important values and norms for the organization in their attitudes and behaviors emphasize that these values and norms are even more important and create awareness in employees in this direction (Mayer et al. 1995). When employees see the norms and values of relatable social identity in the leader's

behavior, identification process with the leader and the organization can take place (Dirk and Ferrin 2002). In this process, it may also be effective for the leader to set goals and objectives that may coincide with the group values and norms. This process enables the leader to convey his or her vision to their followers and to connect emotionally. Ultimately, the perception that "we are one" and that "we can only succeed if we are one" begins to form in the followers. This can make followers see the leader as a team player, strengthening their sense of belonging, attachment and trust over time.

The general framework of the leader schemes consists of the leading figures who are loved and connected (Mayseless 2010). These cognitive descriptions can also create a framework for an effective leader, either directly or indirectly. A recent meta-analysis revealed that prototypicality accounted for 24% of variance in leader evaluation (Barreto and Hogg, 2017). The concept of leader effectiveness or effective leader is defined differently in the literature. For example, de Vries et al. (2015) refers to contingency and defines leader's effectiveness as being able to adapt easily to any situation. Barreto and Hogg (2017: 45). measured the effectiveness with observing "how successfully they achieve group goals" in their meta-analysis. On the other hand, Giessner et al. (2009) simply defines it as organizational success/failure, while in other studies (Fein et al. 2020) it is defined as the success of motivating followers to achieve organizational goals and managing the expectations and needs of followers while doing so. Since both the first and fourth definitions refer to a relational process, they are suitable for our research model in this article. In alignment, Stevens et al. (2019) argues that the leader effectiveness is caused by the sense of identity shared by its group members.

Within frames of findings presented beyond;

H1: Leader prototypicality has a direct impact on leadership effectiveness.

2.3 The Mediating Role of Trust in the Leader

The role of trust in leadership literature is referenced thoroughly throughout the literature (Goodwin et al. 2011) and emphasized repeatedly (Liden et al., 2015). Trust in leadership is studied as an outcome, a moderator, and as a mediator variable in research models within the literature. Trust is accepted as one of the most important aspects of leadership qualities (Platow et al. 2003). As claimed by Podsakoff et al. (1996), trust seems to be an important variable that has the power to mediate the effectiveness of transformational leadership. Likewise, our suggestion is that it is a significant mediator of leader effectiveness. The model is based on the triggering effect of leader behavior on followers' perception of trust and respect to their leaders and in return a feeling of enhanced motivation. Additionally, when leaders are seen as group members, i.e. as "one of us" (Steffens et al. 2018), they are "trusted as the most reliable source of identity-related information" (Barreto and Hogg 2017: 42). Consequently, followers endorse, support and allow leaders to be effective" (p.42). Furthermore, they believe that prototypical leaders are usually seen as highly trustworthy (Barreto and Hogg 2017; Steffens et al. 2018). However, due to its referral to a follower perception (e.g. personality, leadership style), effectiveness could not be directly related to prototypicality. The concept of group prototypicality is defined as having a very close psychological relationship with trust than effectiveness (Barreto and Hogg 2017), which implies an indirect relationship.

From the perspective of the classifications of Hofstede (1980, 2011) and Schwartz (2006) it is unclear whether trust in individualistic societies can produce the same results in a collectivist society's (Shavitt et al. 2008, 2011). This issue has not been the subject of research. The undeniable effect of the perception of trust in the leader on the performance of organizations (Morgeson et al. 2010) requires more studies on trust in the leader in societies with different cultural characteristics. Especially considering the importance of trust within organizations and the wider business context. New studies are needed in collectivist societies where distinguishing "us" versus "them" has the effect of identifying others who can be trusted or not. This may be particularly relevant in the context of collective societies where social and collective identity is essential (Hogg 2001; Hogg et al. 2004).

Within frames of literature review;

H2a: Trust in leader is a mediator between leader prototypicality and leadership effectiveness.

H2b: Trust in leader is a moderator between leader prototypicality and leadership effectiveness.

2.4 Leader Political Behavior and Skills

Political behavior is a form of informal influence that is a foundational element of leadership (Ferris and Hochwarter 2011). Politically skilled leaders are able to adapt themselves to the environment through their social intelligence, allowing them to read interpersonal relationships with the power of intuition, and influence those around them, in return establish new relationships (Özdemir and Gören 2015). Hochwarter et al. (2020) reveals that organizational policy perceptions can affect the stress, performance and health status of employees in the workplace requiring a different perspective on the subject. Within the framework of the extant literature, it can be said that the concepts of organizational politics, political skills and political behavior interact with each other and develop together (Ferris and Treadway 2012). When we look at this interaction from the point of view of the leader, one of the factors affecting the political ability of the leader is seen as organizational policy perceptions (Chang et al. 2009). This

relationship from the perspective of employees reveals that organizational policy perceptions may vary according to the value perceptions of the societies they live in (Zibenberg 2017). The fact that the value perceptions of societies in terms of employees affect the behaviors of employees, such as emotional intelligence and extra-role behavior (Lvina et al. 2012). Hence, facilitating the political skills of the leaders to be shaped and developed. In addition, considering that employees' perceptions are constructed according to cultural codes (Kastanakis and Voyer 2014), one might think that culture can shape both organizational policy and political skill. Cultural codes, and therefore perceptions of value, may lead to the leader's development of political behavior and skills through employees' perceptions of policy.

Although the perception of organizational policy in different cultures has been compared with the concept of ethics (Zibenberg 2017), as stated above, there is a need for cultural studies in which organizational policy, organizational skills and political behaviors are examined together and contextualized from the point of view of both the leader and the employee's social and cultural perceptions.

Within frames of literature review;

H3a: Leader political skill act as a moderator and decreases the impact of leader prototypicality on trust in leader.

H3b: Leader political skill act as a moderator and decreases the impact of leader prototypicality on leadership effectiveness.

3 Methods

3.1 Procedures

The participants of the study consist of service sector employees and managers in Ankara, the capital of Turkey, and the surrounding provinces and districts. The HR managers of the organizations. Two of these were mid-sized and three were large sized organizations. They were particularly chosen because of their team structure working environment. Each team was run by a team leader and members vary from 4 to 42. They were contacted and the necessary permissions were obtained. The questionnaires were sent to the contacted HR managers. The researchers then visited the institutions one by one in order to administer and collect the filled-out questionnaires by hand. The surveys were conducted in two separate time periods, the first on January of 2022 and the second on the month of February of 2022. A survey of managers (Leader Political Skills) and employees (Trust in leader) were conducted in the first visit. In the second, the remaining two questionnaires were filled. A total of 445 employees and 32 executive surveys were filled in. However, as a result of the surveys that were removed for incomplete or other reasons, 442 employee and 28 manager surveys were used and included in the analysis. All the scale items were measured using a five-point Likert scale from 1 = "strongly disagree" to 5 = "strongly agree." Whereas political skills were measured at the leader level, leadership prototypicality, trust in leaders, and leadership effectiveness were assessed using several employees' ratings of the same manager.

To account for the nested nature of the data (i.e., subordinates were nested inside supervisors), we utilized multilevel path analysis to evaluate the hypotheses. The variance of a Level-1 variable is decomposed within a component (within-group variance). and a between component (between-group variance). The definition of structural linkages may be used to describe the relationships between these variance components at each level (Muthén and Asparouhov 2009).

The intraclass correlation coefficient (ICC). is commonly used in multilevel research to assess the extent of variability between groups. In this study, the ICC was calculated using variance components derived from a one-way random effect ANOVA (LeBreton et al. 2023). Specifically, the ICC(1) statistic was employed to understand the discrimination between groups based on the aggregation of scores using unit-level means. For interpreting the ICC values, a significant ICC(1) value falling within the range of 0.05-0.20 is considered noteworthy (Bliese 2000). Additionally, the ICC(2) statistic, which also relies on variance components obtained from the one-way random effects ANOVA, provided insight into the discrimination between groups based on means (LeBreton et al. 2023). A recommended cut-off value for ICC(2) is 0.60 (Glick 1985; Schneider et al. 1998). To assess within-group concordance, rwg(j) values were utilized (James et al. 1984). Specifically, a one-way analysis of variance (ANOVA) was conducted to determine if responses from multiple direct reports converged and could be aggregated. The ANOVA yielded a significant result, $F(27, 393) = 6.89$, $p < 0.000$. The calculated ICC(1) and ICC(2) values were 0.28 and 0.85, respectively, indicating moderate and high levels of discrimination between groups. Furthermore, the average Rwg (multi-item scale) was found to be 0.86, suggesting acceptable within-group concordance (Klein and Kozlowski 2000).

Multilevel path analysis was utilized, as suggested by Preacher et al. (2010) due to it being more suited for assessing multilevel mediations in comparison to the hierarchical linear modeling technique. It is also believed that it extends Baron and Kenny's (1986) multi-step regressions to the multilevel situation. Sun et al. (2012:60). put forth the strengths of multilevel path analysis as follows; "a multilevel path model can (1) avoid the potential problem of conflating between-group and within-group relationships, (2) directly estimate indirect effects and the multiple paths that are components of these indirect effects, and (3) provide fit indices for the overall model". Thus, we em-

ployed SPSS 23 and MLMED - BETA VERSION 2 for multilevel path analysis.

3.2 Measures

Political Skill Inventory: Subordinates' perceptions of their leaders' political skill were measured by this 18 item-inventory, developed by Ferris and his friends (2005). Items assessed leaders' social astuteness (e.g. "He/she has good intuition or "savvy" about how to present him/herself to others"), perceived interpersonal influence (e.g., "He/she is good at getting people to like him/her"), apparent sincerity (e.g., "He/she tries to show a genuine interest in other people"), and networking ability (e.g., "He/she is good at using his/her connections and networks to make things happen at work"). Both coefficient alpha (α = .92) and composite reliability estimates (CR = .82) for the higher order construct were adequate. The four-factor model had acceptable fit indices (X2=386, df=129; RMSEA=.07; CFI=.93; TLI=.91).

Leader Group Prototypicality Scale: The participants were asked to rate their agreement on six items developed by van Knippenberg and van Knippenberg (2005). It was adapted to Turkish by Ömür (2018). Items assessed leader prototypicality through statements such as "The team leader shares a lot of similarities with the members of my team". To determine the composite leader group prototypicality score, the responses to each item were summed. Both coefficient alpha (α = .89). and composite reliability estimates (CR = .93) for the higher order construct were adequate. The one-factor model had acceptable fit indices (X2=0.002, df=1; RMSEA=.00; CFI=.1; TLI=.1).

Trust in Leader Scale: The scale consisted of two factors and ten items. Originally it was developed by McAllister, 1995 and adapted to Turkish by Ari (2003). Items assessed Cognition-based (e.g. "This person approaches his/her job with professionalism and dedication") and Affect-based (e.g. "We would both feel a sense of loss if one of us was transferred and could no longer work together"). The reliability of this score was high, with a Cronbach's Alpha of .96 so is the composite reliability estimate (CR=.94). Additionally, cognitive-based trust's reliability score was .92 and Affect-based trust was .93. Lastly, both factors' CR estimates (CR=.93 and CR=.93) were adequate. The two-factor model had acceptable fit indices (X2=95.7, df=32; RMSEA=.07; CFI=.98; TLI=.97).

Leadership Effectiveness Scale: Incorporating nine items, the scale was developed by Ng & Chan (2008) and adapted into Turkish by the authors. The scale assesses the leadership effectiveness through items such as "planning ability" and "setting direction". Both coefficient alpha (α = .97) and composite reliability estimates (CR = .96) for the higher order construct were adequate. The one-factor model had acceptable fit indices (X2=66.8, df=23; RMSEA=.07; CFI=.99; TLI=.98).

Table 1: Confirmatory factor analysis of key variables in the study

Factor structure model	**X^2(df)**	**X^2/df**	**GFI**	**CFI**	**SRMR**	**RMSEA**	**$\Delta\chi^2$(Δdf)**
Three factor (hypothesized): Leader group prototypicality, leader effectiveness, trust in leader	326.4(146)	2.235	0.923	0.928	0.024	0.054	
Two factor							
Model 1 (alternative): Leader group prototypicality and leader effectiveness constrained as one factor	1122.7(187)	6.003	0.808	0.901	0.060	0.109	796.3(41)
Model 2 (alternative): Leader effectiveness and trust in leader constrained as one factor	1755.6(188)	9.338	0.577	0.833	0.067	0.141	1429.2(42)
Model 3 (alternative): Leader group prototypicality and trust in leader constrained as one factor	1156.7(188)	6.152	0.798	0.897	0.045	0.111	830.3(42)
One factor (alternative): All three scales together as one factor	2167.6(189)	11.469	0.554	0.790	0.074	0.158	1841.2(43)

* Note: N = 420, All χ^2 and $\Delta\chi^2$ values are significant at $p < 0.05$, χ^2 =Chi-Square, df=Degree of Freedom, GFI=Goodness of Fit Index, CFI=Comparative Fit Index, SRMR= Standardized Root Mean Square Residual, RMSEA=Root Mean Square Error of Approximation

Controls: We accounted for several demographic variables related to employees. Gender orientation was categorized as 0 for Male and 1 for Female. Additionally, we controlled for employees' age, education level, and tenure (number of years spent working with supervisors).

4 Findings

From the 420 subjects, 237 were women and 183 were men. Their age cohorts were as follows: 18% varied 18-25; 25% varied 26-30; 31% varied 31-40; 18% varied 41-50; 9% varied > 51. Additionally, 11% completed secondary education and 38% high school education; 21% obtained a vocational school diploma; 24% got a bachelor degree; and 6% had a master's degree. On average, they have worked in their current organizations for about 17 years. The average age of the 28 managers was 43 years with a tenure of 25 years; There were 5 women and 23 men. Approximately 21% of the sample of managers had a high school education; another 11% had a vocational school diploma; 57% got a bachelor's degree and 11% had a master's degree.

4.1 Confirmatory Factor Analyses

To begin, we carried out an omnibus confirmatory factor analysis (CFA) to confirm that the three employee-reported variables were distinct: Leader group prototypicality, trust in leader, and leadership effectiveness. Individually, we compared the CFA models. The three-factor model performed better than the null model and the one-factor model (see Table 1). The comparative fit index (CFI) and root-mean-square error of approximation (RMSEA). of the three-factor model were also higher than those of the one-factor model (CFI=.92, RMSEA=.054). As a result, we treated these three measures as distinct constructs as we proceeded with our analyses.

Table 2: Means, standard deviations, and correlations between study variables

	Mean	S.D.	1	2	3	4	5	6	7	8	9
Individual Level											
1.Gender	0.436	0.496	1								
2.Age	2.75	1.20	-143**	1							
3.Education	2.76	1.12	-0.028	0.079	1						
4.Tenure w. supervisor	2.77	1.47	-0.156**	0.630***	0.292***	1					
5. Organizational tenure	14.4	6.75	0.063	0.070	0.027	-0.002	1				
6. Trust in leader	3.81	0.974	-0.041	-0.059	-0.120*	-0.165***	0.053	(.96)			
7. Group Prototypicality	3.45	1.12	-0.017	-0.019	-0.045	-0.120*	0.108*	0.593***	(.89)		
8. Leadership effectiveness	3.84	1.12	-0.025	-0.054	-0.087	-0.160***	0.014	0.790***	0.515***	(.97)	
Group Level											
9. Leader political skill	4.29	0.317	0.058	-0.158**	-0.340***	-0.204***	0.020	-0.009	-0.041	-0.003	(.92)

(1) Individual level N=420; group level N=28
(2) Coefficient alphas are listed in parentheses along the diagonal
(3) Gender is coded as 0=female; 1=male
(4) Age is coded as "1" = 18-25, "2" = 26-30, "3" = 31-40, "4" = 41-50, "5" = above 51.
(5) Education is coded as "1" = primary, "2"= High school, "3" = associate degree, "4" = bachelor's degree, "5" = master's degree.
(6) Note. * p < .05, ** p < .01, *** p < .001

Table 3: The Results of Multi-level Regression Analyses

Model 1:	**Multilevel Regression Model for Trust in Leader**		
		95% Confidence Interval for Mean	
Level 1	Estimate	Lower Bound	Upper Bound
constant	4,55*** (0,53)	3,46	5,65
Leader Political Skill X Leader Prototypically	-0,24* (0,12)	-0,47	-0,01
Leader Prototypically	0,46*** (0,03)	0,40	0,53
Gender	-0,07 (0,07)	-0,21	0,08
Age	-0,01 (0,04)	-0,09	0,06
Education level	(0,05)	-0,23	-0,04
Level 2		95% Confidence Interval for Mean	
	Estimate	Lower Bound	Upper Bound
Leader Political Skill	-0,23 (0,28)	-0,80	0,35
Gender	-0,30 (0,53)	-1,40	0,79
Age	-0,15 (0,15)	-0,46	0,15
Tenure with manager	-0,2 (0,12)	-0,45	0,05
Organizational tenure	0,03 (0,05)	-0,07	0,13
Education level	0,08 (0,15)	-0,22	0,38
Model 2	**Multilevel Regression Model for Leader effectiveness**		
Level 1		95% Confidence Interval for Mean	
	Estimate	Lower Bound	Upper Bound
constant	-0,38 (0,52)	-1,49	0,74
Leader Political Skill X Leader effectiveness	-0,23* (0,10)	-0,43	-0,03
Leader Prototypically	0,07 (0,04)	-0,01	0,14
Trust in leader	0,68*** (0,04)	0,59	0,76
Gender	0,01 (0,06)	-0,11	0,13
Age	-0,04 (0,03)	-0,10	0,03
Tenure with manager	-0,06 (0,03)	-0,11	0,00

Table 3: The Results of Multi-level Regression Analyses (Continues)

	Estimate	Lower Bound	Upper Bound
Organizational tenure	0,00 (0,00)	-0,01	0,01
Education level	-0,05 (0,04)	-0,13	0,03
Level 2		95% Confidence Interval for Mean	
	Estimate	Lower Bound	Upper Bound
Leader Political Skill	0,15 (0,15)	-0,16	0,45
Trust in leader	1,04*** (0,10)	0,83	1,25
Gender	0,02 (0,27)	-0,53	0,57
Age	0,03 (0,07)	-0,12	0,19
Tenure with manager	0,02 (0,06)	-0,12	0,15
Organizational tenure	0,00 (0,03)	-0,05	0,05
Education level	0,05 (0,07)	-0,10	0,20
-2LL	1766,412		

* p < 0.05, ** p < 0.01, *** p < 0.001 n= 420;n=28
Estimates are non-standardized
Standard errors in parenthesis

4.2 Common Method Bias

In order to mitigate the potential influence of common method bias, data for the variables in this study were collected from two different sources. This approach helps to address the issue of common source variance (Podsakoff et al., 2003). The results of the confirmatory factor analysis provided evidence that the four-factor measurement model ($\chi 2 = 2167.6$, df = 189, GFI = 0.55, CFI = 0.79, RMSEA = 0.16) outperformed the one-factor measurement model. This indicates that the presence of common source variance was not a significant concern in the present study (Podsakoff et al., 2003).

4.3 Hypothesis Testing

Table 2 below exhibits means, standard deviations and intercorrelations of the study variables. At the individual level, trust in leader was positively related to group prototypicality (r=.59, p<0.001) and leadership effectiveness (r=.79, p<0.001), group prototypicality was positively correlated to leadership effectiveness (r=.52, p<0.001). At the group level, leader political skill had no significant relationship with the other variables. However, it was negatively related to subordinates' age (r=-.16, p<0.01), education level (r=-.34, p<0.001), and tenure with supervisor (r=-.20, p<0.001). Organizational tenure was only correlated to group prototypicality (r=.11, p<0.05).

We asserted that leader prototypicality affects leader effectiveness in our first hypothesis, stating 'leader prototypicality has a direct impact on leadership effectiveness'. A regression analysis was conducted to examine the relationship between leader prototypicality and leader effectiveness. The standardized coefficient for leader prototypicality is 0.515, indicating that for a one-standard-deviation increase in leader prototypicality, the dependent variable, leader effectiveness, increases by 0.515 standard deviations. This finding suggests a strong and significant impact, thus supporting our first hypothesis.

Relooking at Table 3 for our second hypothesis, we claimed a mediation effect of trust in the leader at Level 1.

Before reaching a conclusion, we checked the sub-hypotheses. For H2a, we posit that leader prototypicality has a direct impact on trust in the leader. This assertion is supported (b = 0.46, SE = 0.03, p < 0.000, 95% CI [0.40, 0.53]).

Our second sub-hypothesis, H2b, posits that trust in the leader has a direct impact on leader effectiveness. The results of this assertion is presented in Model 2. We find support for this hypothesis as well (b = 0.67, SE = 0.04, p < 0.000, 95% CI [0.59, 0.76]). Leaders who are trusted by their subordinates are perceived as more effective in their leadership roles.

The last checkpoint is to examine if the prediction of the independent variable on the dependent variable is non-significant. Again, in Model 2, our analysis reveals a non-significant effect for this (b = 0.07, SE = 0.04, n.s., 95% CI [-0.01, 0.14]). Thus, we can conclude that a mediation effect exists at Level 1, and H2 is also supported.

Our second model is also a multilevel regression analysis that examines the factors influencing leader effectiveness. The Level 1 results indicated that several variables significantly predicted leader effectiveness. At Level 1, the constant term was found to be -0.38 (SE = 0.52, 95% CI [-1.49, 0.74]), suggesting that the average level of leader effectiveness was -0.38. However, none of the Level 1 predictors, including leader prototypicality, trust in the leader, gender, age, tenure with manager, organizational tenure, and education level, had statistically significant associations with leader effectiveness.

4.4 Moderations

In our first model, at Level 2, we conducted the first interaction analysis to examine how leader political skill moderates the relationship between leader prototypicality and trust in the leader. The interaction between leader political skill and leader prototypicality was negatively associated with trust in the leader (b = -0.24, SE = 0.12, p < 0.05, 95% CI [-0.47, -0.01]). This suggests that when leaders with high political skill were also perceived as more prototypical, they tended to have lower levels of trust from their subordinates. Thus, we find support for H3a.

As seen in Figure 1, when the employees perceive low level of political skill, and higher levels of leader prototypicality, trust in their leader increases.

In the second model, at Level 2, the analysis revealed that the interaction between leader's political skill and leader effectiveness was negatively associated with leader effectiveness (b = -0.23, SE = 0.10, p < 0.05, 95% CI [-0.43, -0.03]). This suggests that leaders with high political skill who also demonstrated effectiveness had lower overall levels of leader effectiveness (See Figure 2). This supports our H3b.

The -2LL for the model was 1766.412, indicating a good fit to the data. Please note that the all estimates provided, except for the first analysis of hypothesis one, are non-standardized.

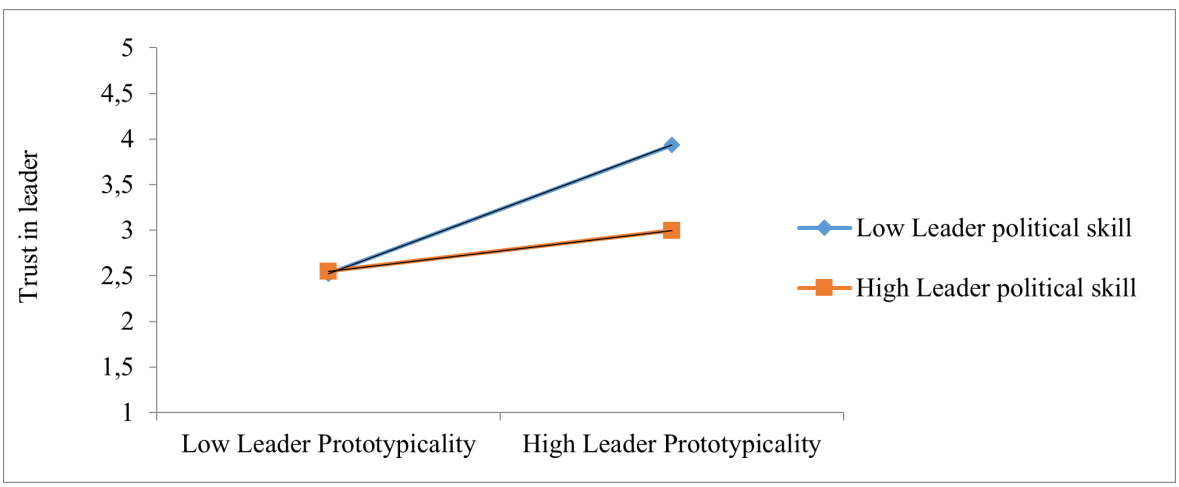

Figure 1: First Moderation Results

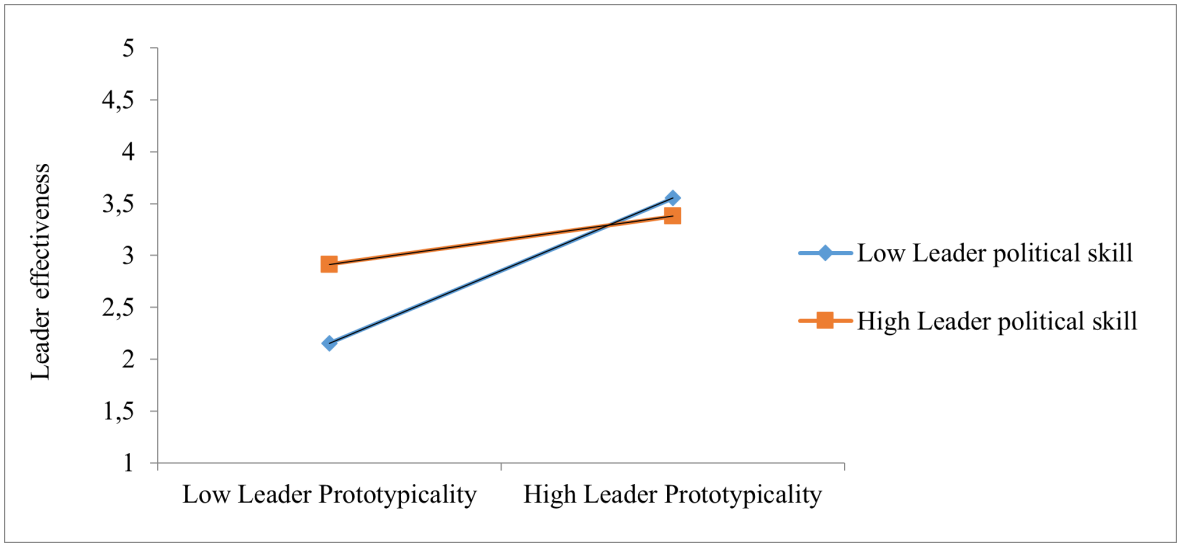

Figure 2: Second Moderation Results

5 Discussion

The paper has examined leading political skills within the framework of social identity theory, in which internal interactions within the organization may impact the attitudes and behaviors of leaders and the perception of the leader prototype of the employees. The study employed second-level regulatory variables and created a cross-level moderated mediation model to test the model within a collectivist culture like Turkey. In general, different leader skills and perception of the leader prototype may occur in different organizations. Therefore, with this in mind, data obtained in this study was collected from the employees of different organizations, and samples were compared with the data obtained from the leaders of the same employees. In doing so, the study measured subordinates' perceptions of their leader's political skills (Giessner et al. 2009) in order to assess their social astuteness in terms of how they perceived their leader's interpersonal influence, sincerity and networking ability. In addition, the study examined ratings in relation to the leader's prototypicality, as well as both cognition-based (i.e. professionalism and dedication to job) and affect-based (i.e. sense of loss of transferred or could no longer work together). trust in the leader. Lastly, leadership effectiveness was measured through perceived 'planning ability' and 'setting direction'. The combining of leadership effectiveness and leadership political behavior within the study showed that no matter how much emotional relationship is established, if leaders who do not provide their followers a sense of empowerment and development, they do not produce a high level of emotional trust. More precisely, a strong and significant impact of leader prototypicality on leadership effectiveness was found to also have a direct impact on trust in the leader and their perceived leader effectiveness. Thus, demonstrating that leaders trusted by their subordinates are also perceived as more effective in their leadership roles. To add on, leaders with high political skills are perceived to be more prototypical, with lower levels of trust from their subordinates. Their leader effectiveness also was negatively associated with leader effectiveness.

The contributions of the study are threefold. Firstly, contributing to the leadership literature positive aspects of leader political skills in comparison to a large extant of literature presenting the negative aspects (Hochwarter et al. 2020) of political behavior of leaders. More particularly, the perception of effective leadership is revealed as a perception of the leader prototype rather than to the behavior of the leader (Mahon and Greenwald 2018). The study revealed that leaders adopted and aligned their leadership behavior to the organizational culture in order to influence their followers and direct them to accomplish the goals and objectives of the organization. Although Steffens et al. (2021) draws attention to the difference between group prototypicality and leader prototypicality in that the notion of leader prototypicality is used in works focusing on implicit leadership theories, this study took a different perspective. The study confirmed that at the individual level trust in leader was positively related to group prototypicality and leadership effectiveness, indicating that the average group prototype represented the perceived characteristics or qualities that are most commonly associated with leadership within a particular group or organization. Moreover, it reflected the collective perception of what constitutes effective leadership based on the experiences, norms, and values prevalent within the group (Shavitt et al.

2008, 2011). The study conjectures that the average group prototype may emerge from observing and generalizing the behaviors and traits displayed by leaders who have been successful in that particular context. Moreover, it represents the common expectations and standards held by group members regarding leadership, serving as a benchmark for evaluating leaders within the group. Hence, the average group prototype of leadership is perhaps shaped by various factors such as organizational culture, historical leadership practices, and the shared beliefs and values of group members.

Secondly, the study combines leadership effectiveness and leadership political behavior in cooperation to one another rather than as contradictory and opposite sides of organizational and leadership collaboration. In doing so, we demonstrate the positive contributions in confirmation to Mahon and Greenwald (2018). In contrast to a large number of studies within the extant literature focused solely on the political behavior in respect to the perception of managers' without examining other relations (e.g. Mehmood et al. 2019; Landells and Albrecht 2019; Hochwarter et al. 2020). There are studies that attempt to cover both theoretically as well as empirically to better understand the mechanism regarding the relationship between the political skills and the effectiveness of leaders. Treadway et al. (2004) argue that the idea of leader political skill is fundamentally multi-layered. This approach is in line with current requests for leadership theory that more truly portrays the nested character of organizational phenomena. Additionally, they (Treadway et al. 2004:493) elaborate "that political skill is one of the most important competencies leaders can possess, contributing to effectiveness in organizations". In a meticulous recent meta-analysis, it is claimed that obtaining relevant political skill appears to be advantageous for leaders to enhance their effectiveness by either obtaining or developing it (Ferris et al. 2019). But interestingly, it is concluded that to yet, no empirical study has been undertaken to evaluate theories about the implications of a leader's political competence on employees (Treadway et al. 2004).

Thirdly, we contribute to the argument on the perception of leadership within groups a multilevel model that evaluates within- and between-level variance, helping to better understand the collective, dyadic, nested, and within-person effects that have been noted by Mahon and Greenwald (2018) to be sparse within the literature. The study provides that leader prototype perceptions of employees increased their perceptions of trust in the leader; moreover, the perceptions of trust in the leader had a full mediating effect between the leader prototype perception and the leader effectiveness perceptions. The inclusion of leader's political skills utilizing a multilevel analyzes added great value to the findings and to the originality of the research. As so, the findings provide validity of social identity theory outside of individual western societies (van Dick and Kerschreiter 2016). The validity of social identity theory is proven in Turkish society, in which leader's political skills compatible with norms and cultures are functional. Therefore, it is important to note that cultural influences on the perception of leader political behavior are complex and multifaceted. Cultural dimensions interact with individual differences, organizational factors, and situational factors, creating a dynamic context for interpreting and evaluating leader political behavior. Understanding these cultural influences can help leaders and organizations navigate cross-cultural contexts and adapt their leadership behaviors accordingly. When propositions of social identity theory are examined in the light of Zibengerg's (2017) studies, it can be thought that organizational politics, political skills and perceptions of leader prototypes can be influenced not only by organizational culture, but also by the characteristics of society.

Culture plays a significant role in shaping the perception of leader political behavior within an organization. These cultural norms influence how leader political behavior is perceived. In some cultures, political behavior may be viewed as acceptable and even expected, while in others, it may be seen as unethical or detrimental to trust and cooperation. The findings through multilevel analyzes in this study demonstrated that the initial predictions that political skill affects both cognitive and emotional confidence in a similar way, was not realized. Although Turkish society exhibits vertical collectivist traits (emphasizing hierarchy). cultural differences and their implications for persuasive appeals (Shavitt et al. 2008), we conjecture that these tend to lean towards vertical individualist behaviors, where people tend to be concerned with improving their individual status and with distinguishing themselves from others via competition (Shavitt et al. 2011). In addition, the study reveals that political skills were found to affect both cognitive and emotional confidence. As so, the assumption that individuals in organizations will have high perceptions of trust towards each other was not found depending on emotional components and/or on events in societies showing collectivist characteristics, the study found no significant difference between cognitive trust and emotional trust perceptions. The reason for this may be that Turkish society no longer has dominant vertical collectivist characteristics as claimed in past studies, in which people focus on complying with authorities and on enhancing the cohesion and status of their in-groups, even when this entails sacrificing their own personal goals (Shavitt et al. 2011). Findings show that individuals tend to develop the perception of trust based on the constructive and developing behaviors of leaders (personal empowerment). towards the employees despite the leader's political discourse and behavior. The causes of this is conjectured to the lack of dominant vertical collectivist characteristics in Turkish society and to individual tendency to develop perception of trust based on the leader's actions and their sense of

personal empowerment, despite the leader's political discourse and behavior. Consequently, cultural characteristics of Turkish society can be a reference for effective solutions in business management. In collectivistic cultures like Turkey, group harmony and conformity are prioritized, leader political behavior that benefits the group may be seen as more acceptable, even if it involves strategic maneuvers or power plays. Whereas in individualistic cultures, where individual autonomy and personal interests are emphasized, leader political behavior may be viewed more skeptically, as it may be perceived as self-serving or manipulative. Particularly for managers and companies running in collectivist societies like Turkey, the findings of this study have important pragmatic consequences. Leaders should understand that their performance and the confidence they inspire from their subordinates depend much on their political abilities and conformity with organizational standards. These findings allow managers to create training courses improving political awareness and promoting a trusting society. Furthermore, companies can consider cultural aspects in planning leadership development programs to fit the particular requirements and expectations of their employees.

6 Conclusion

In this paper, empirical evidence dealing with how a leader's political skills may act as a moderator that might decrease the effect of prototypicality's impact on trust and on leadership effectiveness was investigated. The study employed a scale of trust used to measure leader's cognitive and emotional dimensions, accepted to be compatible with social identity theory. The findings put forth utilizing social identity theory demonstrates how the leading prototypes formed in the cognitive schemes of individuals reflect the values and norms of the organization, which can build trust in the leader, contributing towards positive aspects of leader political skills rarely observed or studied within the field. Through the combining of leadership effectiveness and leadership political behavior, implications from a multilevel study towards the need to have more leadership effectiveness and political leadership skills investigations as a resource for leadership development has been concluded and brought to light. Furthermore, the use of aggregation and multilevel modeling has allowed evaluating and studying collective, dyadic, embedded, and within-person effects within the literature. This study showed leader's emotional relationship on its own does not provide their followers a sense of empowerment and development nor does it produce a high level of emotional trust. In this respect, values related to support, development and guidance of employees by leaders within Turkish organizational culture compares to western organizational norms (Steffens et al. 2014), and appears to have a part in developing trust.

This research is subject to some potential limitations. First, the study results may be susceptible to same-source bias because all variables were collected from the study participants, consisting of service sector employees and managers in Ankara through site visit surveys. However, the study's design minimized the potential for this bias given that we implemented data collection to multiple organizations, two mid-sized and three large sized organizations from the surrounding provinces and districts of Ankara. In addition, the surveys were conducted in two separate time periods, using time lag and variables from multiple sources can reduce the threat of common source and method variance (Podsakoff et al. 2003). Second, this research was conducted in Turkey, which allows us to examine leadership prototype perception in context characterized by high context values and its citizens are traditionally accustomed to collectivist, high power distance schemas (Hofstede 1980, 2011); however, there are vastly different constraints and experiences in the diverse socio-cultural and geo-political contexts of countries classified as high context cultures. Generalizing the findings of this study to other high context cultures would require caution as there are vast differences between them. Future research may examine the study model in other cultural contexts.

Future studies should investigate, in different cultural settings, the long-term effects of political behaviors and leadership prototypes on organizational outputs. Furthermore, looking at how various forms of trust—cognitive and affective—as well as leadership effectiveness interact in various cultural contexts would help one to grasp the fundamental processes. Research might also look at how views and behaviors of leaders are shaped by outside environmental elements such as society standards and economic situation. All things considered, this paper offers insightful analysis of how political skills and leadership prototypes shape leadership effectiveness and confidence in the Turkish setting. We have shown using a multilevel moderated mediation model that political skills are a major moderator influencing trust and effectiveness of leader prototypicality. These results challenge mostly negative opinions and emphasize the good features of political conduct in leadership, therefore augmenting the body of knowledge already in use. Furthermore, the study emphasizes the need of cultural background in leadership research and provides useful consequences for managers and companies trying to improve the trust in collectivist societies by means of leadership effectiveness enhancement. As a concluding thought with no revelation intended, leaders in Turkish organizational life and we conjecture elsewhere as well benefit when leaders develop their political skills aligned to the goals of the organization and the people they lead, in which their followers' expectations and needs take forefront.

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Večnivojska preiskava dojemanja prototipa vodenja: politično vedenje v povezavi z učinkovitostjo in zaupanjem

Ozadje/namen: Empirični dokazi kažejo, da lahko voditeljeve politične sposobnosti delujejo kot moderator, ki zmanjšuje vpliv prototipičnosti na zaupanje in učinkovitost vodenja. Študija preučuje vodilne politične veščine kot drugostopenjske regulativne spremenljivke v povezavi z učinkovitostjo in zaupanjem vodje, z namenom testiranja mednivojskega moderiranega modela mediacije znotraj tradicionalno kolektivistične kulture, kot je Turčija. Cilj je kontekstualizirati in razširiti razumevanje dojemanja prototipa vodenja.
Metode: Anketiranih je bilo 442 zaposlenih v storitvenem sektorju in 28 vodilnih delavcev. Izvedeni sta bili dve raziskavi v dveh ločenih časovnih obdobjih. Za ovrednotenje hipotez je bila uporabljena večnivojska analiza poti.
Rezultati: Ugotovitve kažejo, da obstaja močan in pomemben vpliv prototipičnosti vodje na učinkovitost vodenja ter neposreden vpliv na zaupanje. Prav tako se izkaže, da so vodje, ki jim podrejeni zaupajo, v svojih vodstvenih vlogah bolj učinkoviti. Nižja raven zaupanja podrejenih je negativno povezana z učinkovitostjo vodje.
Zaključek: Če vodje svojim sledilcem ne morejo zagotoviti kontekstualiziranega občutka opolnomočenja in razvoja, to pomeni, da ne zagotavljajo visoke ravni čustvenega zaupanja. Zato obstaja večja potreba po večnivojskih kontekstualiziranih študijah, ki upoštevajo kolektivne, dvostranske in vgrajene izkušnje znotraj skupin.

Ključne besede: *Politično vedenje voditelja, Politične veščine, Učinkovitost vodje, Zaupanje, Teorija družbene identitete, Turčija*

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Government Effectiveness in the Petroleum Sector: Two-step Analysis Combining Linear Regression and Artificial Neural Networks

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Background and Purpose: To encourage petroleum industry development, a country needs to set up a regulatory framework that standardizes investment conditions. The objective of the research was to investigate the determinants of government effectiveness in the petroleum sector.
Design/Methodology/Approach: Multiple regression analysis was conducted to investigate if government effectiveness in the petroleum sector is influenced by the country's political stability, regulatory quality, the intensity of petroleum exploration and production activities, government take, and type of contract used. Artificial neural network analysis was additionally conducted to identify the importance of independent variables.
Results: Political stability, regulatory quality, government take attractiveness, and the intensity of petroleum activities positively influence government effectiveness. A more attractive government take enhances effectiveness, while the type of contract for awarding petroleum rights did not significantly impact effectiveness. Artificial neural network analysis revealed that the most important variables were regulatory quality and political stability.
Conclusion: The research concluded that political stability, regulatory quality, and the intensity of petroleum activities are key factors in enhancing government effectiveness in the petroleum sector. These findings have practical implications, as they emphasize the importance of stable and well-regulated environments for achieving higher government effectiveness in the petroleum industry. This equips policymakers and industry professionals with actionable insights for improving the sector's performance.

Keywords: *Energy policy, Government effectiveness, Petroleum sector performance, Petroleum resources management, Industry development*

1 Introduction

As petroleum production expanded in the United States, disputes arose regarding land ownership and shares in profit (Hammerson, 2011). American state courts established a legal practice regarding the rights of oil leases and the management of revenue from its production. The 1889 Pennsylvania Supreme Court decision equated the production of oil and gas to that of other minerals, concluding that land ownership does not necessarily entail ownership

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of minerals (Hammerson, 2011). Texas applied the offset rule for neighboring wells and the concept of ownership in place, which defined the ownership principles in petroleum production as either freehold ownership of the land, which included the right to minerals, or partial ownership, which did not include the right to minerals (Thurman, 2022). Capital investments in petroleum exploration and production and the return on investment in this activity could be compared to the riskiest investments in speculative trends on the capital market (Simkins & Simkins, 2013). Despite this, the possibility of exceptionally high profits in the case of a positive petroleum discovery motivated oil companies to take such risks.

The United States legal system is based on the principles of Anglo-Saxon law and precedents, and court decisions have also established the legal practice for relationships among participants in petroleum exploration and production activities. The starting point is the freehold ownership category, which, along with the land ownership, entails the right to minerals, i.e., oil and gas. In contrast, European countries implemented different forms of feudal and royal limitations regarding mining rights. The ownership of petroleum in European countries is considered a public good and is regulated by provisions governing state ownership (Thurman, 2022).

The principal dissimilarity between the petroleum exploration and production business in the United States and the rest of the world stems from the definition of mineral ownership (Seba, 2008). In countries applying Anglo-Saxon law, oil leases are based on freehold ownership, which includes the right to minerals, whereby the lease includes compensation for the land and part of the value of the produced oil and gas. In most countries worldwide, where state ownership of minerals prevails, oil companies acquire the right to minerals from the government. At the same time, the lease for the use of the land is agreed upon with landowners based on local laws and regulations (Simkins & Simkins, 2013). The relationships between the company acquiring the rights to minerals and the previous, i.e., original, owner (freehold owner in the Anglo-Saxon law or the state in continental law) are governed by a contract defining the terms and compensation for rights to petroleum. This is a specific compensation, income, or yield obtained by the landowner (state) and represents a cost for the petroleum lessee, different than all other taxes or expenses. This yield is known as a royalty, i.e., the fee for recovered quantities of petroleum. In the United States, it traditionally amounts to 1/8 (12.5%) of the market value of the produced petroleum (Johnston, 1994).

In the 20th century, contractual relationships in petroleum exploration and production developed due to the rise in petroleum production and exploration and rising oil prices. Oil and gas became essential primary sources of energy, accounting for over two-thirds of primary energy consumption. The expansion of transport led to oil becoming one of the most important primary resources, and the use of energy became important in contemporary industrial infrastructure. This increased value influenced the codification and regulation of relationships among participants in petroleum exploration and production.

In countries with a free market economy, petroleum companies conducting petroleum exploration and production activities were state-owned, forming part of a planned and targeted economy. Following the disintegration of a non-market and planned socio-economic system, free capital ownership has become a global universal principle of relationships. Ownership and contractual relationships in the area of exploration and production of valuable natural resources with high capital intensity and value, such as petroleum, have become a matter of special attention for all government instances.

Laws and legal regulations regarding petroleum production were once part of mining legislation. However, since petroleum is present in the Earth's crust in varying physical and geological forms, exploration is performed using a range of technical means, and the production technology differs from that in the production of solid mineral raw materials. Petroleum legislation sets out conditions for investments in petroleum exploration and production, legal prerequisites for development, and competitive terms regarding petroleum exploration and production (Johnston, 1994). It places significant emphasis on optimization during mineral raw material management processes while primarily protecting national interests and providing petroleum companies (investors) with security and stability as they carry out their investments and business activities (Green & Smith, 2023; Thurman, 2022).

The regulatory framework in every country is based on the nation's constitution, which grants taxing and legislative authority that governs petroleum legislation and outlines authority boundary conditions for relationships with foreign companies. The function of government is to provide an adequate regulatory infrastructure for companies to work economically productive units and ensure they do not swindle the public, exploit workers, pollute their surroundings, prosecute unethically, or engage in morally or socially reprehensible practices (Parra, 2004). Hence, establishing a regulatory framework that standardizes investment conditions is an essential step in promoting the growth of the petroleum sector.

The study aims to examine the factors that influence government efficiency in the petroleum industry. This study employs multiple regression analysis (MLA) to examine the potential impact of political stability, regulatory quality, the intensity of petroleum exploration and production operations, government take, and type of contract on government performance in the petroleum industry. Furthermore, a study of artificial neural networks (ANN) was performed to determine the significance of independent factors.

2 Theoretical background

Petroleum legislation sets out conditions for investments, legal prerequisites for development, and competitive terms regarding petroleum exploration and production. It emphasizes optimization during mineral raw material management processes and provides security and stability for petroleum companies as they carry out their investments and business activities.

The petroleum regulatory framework in a country is based on its constitution, which grants taxing and legislative authority for petroleum legislation and outlines authority boundary conditions for relationships with foreign companies. The constitution also includes specific petroleum legislation that authorizes the national oil company or responsible ministry to negotiate certain aspects of agreements between the state and foreign companies. Tax liabilities are usually included in the agreement signed between the parties (government and petroleum company) and regulated by separate laws.

Governments provide an adequate regulatory infrastructure for companies to work economically productive units and ensure they do not swindle the public, exploit workers, pollute the environment, prosecute unethically, or defraud shareholders. Changes in the economic environment and the increasing interest of foreign investors have indicated the need to regulate petroleum exploration and production in a manner defined and accepted within global practice. Petroleum legislation needs to create conditions for large investments, determine the legal prerequisites for energy development, and protect national interests in the petroleum sector.

Petroleum lease contracts are more similar to financial contracts than typical land concessions or mining concessions due to the uncertainty of petroleum prices and the increased strategic role of petroleum. Both parties have individual interests, with the oil company minimizing risk and the government increasing its share in profit distribution. This results in direct increases in fiscal revenue through royalties, taxes, and indirect contributions.

The fiscal regime, or petroleum taxation model, is a financial structure that oil companies must pay to countries for petroleum exploration and production activities. It is often represented as a government take versus an oil company take, with the government taking the percentage of profit that goes directly to the state budget and the oil company taking the percentage remaining with the company (Johnston, 2003). There are 145 countries worldwide with specific fiscal and contractual terms for engaging with oil companies for petroleum exploration and production operations (IHS Energy, 2016). These regimes can be divided into two main categories: the concessionary system (based on royalty and tax payments) and the production-sharing system (based on petroleum production sharing) (Green & Smith, 2023).

The fiscal regime, if balanced and regulated properly, can attract significant investments in exploration and production activities and create wealth for the nation. The higher the government take, the greater the probability of creating wealth for the nation. To determine the attractiveness of the fiscal regime, the government take is combined with other measures of profitability, including fiscal system flexibility, revenue risk, and fiscal stability (Johnston, 2003). The most common fiscal regime terms used worldwide are bonuses, fees, state participation, royalty, production sharing, cost recovery, and taxes (Simkins & Simkins, 2013). The terms of the fiscal regime differ among countries, and not all are included within one particular regime.

Production sharing is a fiscal regime that allows revenue from petroleum production to be shared between the domicile country and the oil company, allowing the company to recover costs and make a return on investment (Johnston, 2003). The three main elements of production sharing are cost recovery, excess cost recovery, and profit share. Taxes are common to both fiscal regime systems, including corporate income tax, additional profit taxes defined only for petroleum operation companies operating in the domicile country, and dividend withholding taxes.

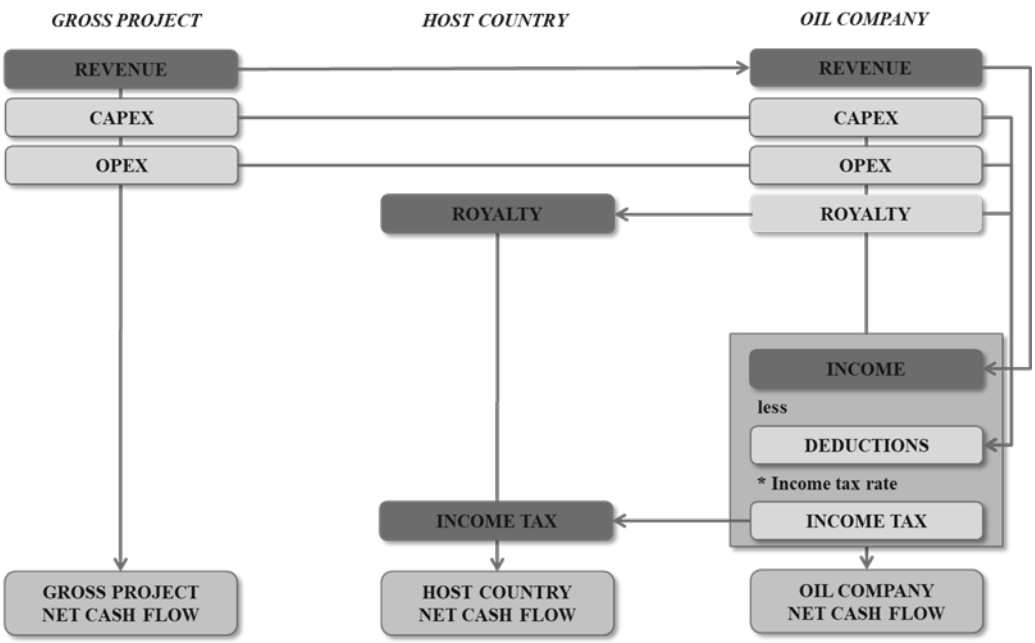
The ideal fiscal regime should ensure a stable business environment, minimize sovereign risk, discourage undue speculation, provide the potential for a fair return, balance risk and reward, avoid complexity, limit administrative burden, allow flexibility, and promote healthy competition and market efficiency (Johnston, 2003). The most common petroleum industry-recognized fiscal regimes fall broadly into two categories: the concession system, which includes special fees and taxes payable in money to the country where it is operating, and the contractual (production sharing) system, which includes production sharing arrangements where petroleum is usually shared in kind between oil company and domicile country (Simkins & Simkins, 2013).

In the concessionary system, oil companies have the right to perform petroleum exploration and production at their own cost, assuming the overall risk of discovery and production risks. The royalty goes directly to the country as one part of the country's petroleum profit, and all taxes are payable on profit before income tax (Seba, 2008). Figure 1 shows the typical revenue distribution under the concession system and illustrates the hierarchy of royalties, deductions, and examples of possible taxation layers. Of the total revenues collected from petroleum produced, the royalty (percentage of total petroleum value) goes directly to the country as one part of the country's petroleum profit (state budget revenue). Before-tax calculations, royalties are deducted together with all capital and operating expenditures (CAPEX and OPEX) from total revenues to give the oil company profit before income tax. All taxes (income tax, petroleum special tax, and any other taxes)

are payable on profit before income tax. Income tax goes to the country as the second part of the country's petroleum profit (state budget revenue). The remainder after taxes is the oil company's petroleum profit.

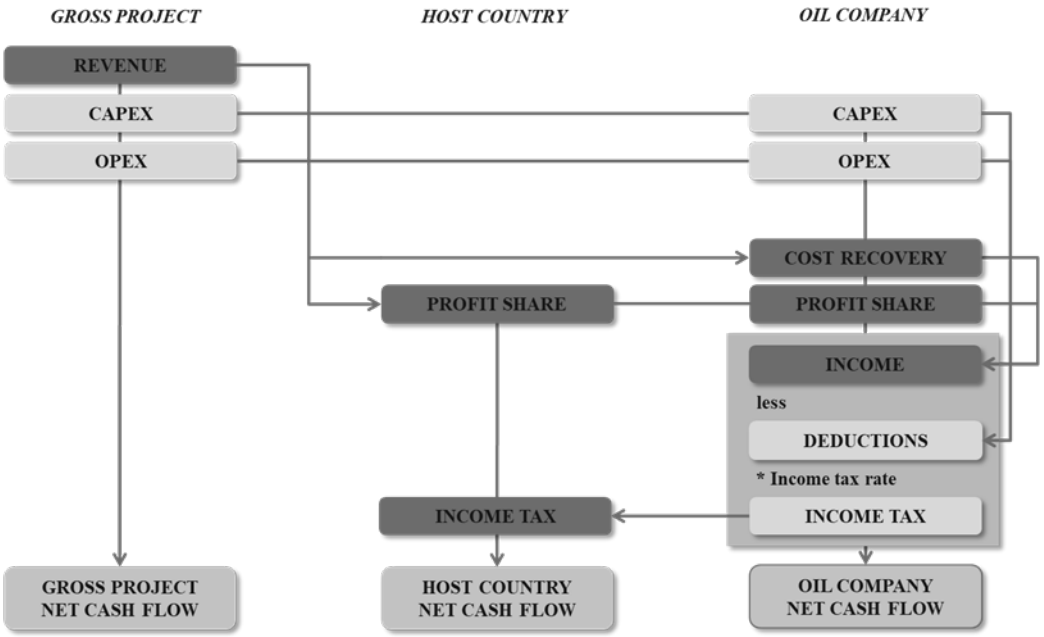
Production sharing contracts (PSC) are a newcomer to the petroleum industry, starting in 1966 in Indonesia (Markus, 2014). These contracts involve a contractual relationship between the state and the oil company, with the state owning petroleum rights and the oil company ensuring the execution, technical, and financial realization of petroleum exploration, development, and production (Seba, 2008). The aim is to maximize income and initiate economic activities connected to petroleum exploration and production. Production is split between the host government and the contractor, with the government maintaining ownership of the produced petroleum. Stabilization clauses are essential to ensure the preservation of the tax system and fiscal proportions throughout the contract. Figure 2 shows typical revenue distribution under the production-sharing system and illustrates the calculation of revenues and costs that would be experienced in a full cycle. From total revenues, collected from the petroleum produced, cost recovery is deducted first. Cost recovery includes all capital and operating expenditures (CAPEX and OPEX) borne by the oil company in producing the petroleum, and this is the oil company's revenue. What remains after cost recovery is the profit share. Profit share is then split between the country and oil company based on the contracted percentages. Profit share represents one part of the country's petroleum profit (state budget revenue), while for the oil company, it is one part of the oil company revenue. From oil company revenue, comprised of cost recovery and the company's part of the profit share, all capital and operating expenditures (CAPEX and OPEX) are deducted. What remains after deductions is subject to taxation. Income tax is paid to the country, representing the second part of the country's petroleum profit (state budget revenue), while the remainder after taxes is the oil company's petroleum profit.

Fiscal regimes are often categorized as hybrids, combining elements of both classifications, such as royalties and taxes. These hybrid systems aim to ensure petroleum profit from the start of production, with most countries using the concessionary system (royalty/tax contract) and production sharing system (production sharing contract). As shown in Table 1, most countries worldwide use these two systems: concessionary system (royalty/tax contract) and production sharing system (production sharing contract).



Source: Doric B. (2017)

Figure 1: Concession system - Typical cash flow diagram



Source: Doric B. (2017)

Figure 2: Production sharing system - Typical cash flow diagram

Table 1: Types of contracts (agreements) used worldwide

Type of contract	Number of countries
Royalty/Tax	78
Production Sharing Agreement	52
Mixed / Various	15

Source: IHS Energy (2016a)

Contract terms for oil exploration and production contracts include fiscal terms, work commitments, insurance, and local content. Work commitment is crucial for the host country to ensure the oil company commits to as much work as possible, enabling quicker development of potential new production and revenue generation. Insurance is essential to ensure high-quality work commitments and cover potential losses. Contracts often require the oil company to buy goods and services locally to boost local industry development and employ local labor. The recognition of exploration and production costs is sensitive, as the investment of funds and risk lies with the oil company. The country must establish a fiscal regime that maximizes revenues and provides investors with incentives to explore and develop petroleum efficiently. The license round procedure for petroleum exploration and production is industry-standardized and consists of several steps.

Concessionary and production-sharing systems have advantages and disadvantages, but the choice of system may not be as critical from an economic, accounting, and financial perspective (Johnston, 2003). The fundamental difference between the two systems lies in the ownership of the petroleum produced.

To encourage petroleum industry development, a country needs to set up a regulatory framework that will standardize the conditions for investments in petroleum exploration and production and lay down the legislative prerequisites for the development and competitive conditions in this activity. The function of government is crucial in organizing and managing the petroleum sector since an adequate regulatory framework will ensure that exploration and production activities are conducted in a way that

will create wealth for the nation, protect the environment, and enable companies to work in a stable and competitive environment (Parra, 2004). Many authors (Falola & Genova, 2005; Shaffer, 2011; Thurber et al., 2011; Holden, 2013; Kemal, 2016) have argued that political stability is an important prerequisite for petroleum industry development and enables economic growth and generates wealth for the nation. Most of the theories to date have been based on historical information and statistical observations on the development of the petroleum industry. Thurber et al. (2011) went a step further in their empirical research, indicating that some countries implementing the Norwegian Model failed due to a lack of institutional quality and political stability, which influenced government effectiveness in the petroleum sector. This argument was further elaborated by Kemal (2016), who stated that the economic impact due to changes in petroleum governance might depend on political conditions. The literature has indicated that political stability is an essential factor that directly influences government effectiveness and thus shows the ability of the government to create a stable environment when it comes to investments in the petroleum sector.

The theory discussed demonstrated that petroleum legislation is the main factor in regulating the complex relationship between governments and oil companies in petroleum exploration and production activities. It lays down the conditions for investments, the legal prerequisites for development, and competitive terms and conditions. As political stability directly dictates the government's ability to implement adequate policies and regulations for industry development, regulatory quality is another important factor that can also impact government effectiveness.

Exploration activities are crucial for discoveries and petroleum production. The more an oil company invests in exploration activities, the greater the probability of new petroleum discoveries and developing new petroleum production. Petroleum exploration intensity depends on geological probability, which also depends on the investor's (oil company) investment in exploration and production activities and the owner's (government) ability to attract investments and enable exploration and production activities. Therefore, the intensity of petroleum exploration and production activities is another factor that may influence government effectiveness.

Moreover, suppose the relationship between the promising petroleum potential and the requirements set in the fiscal regime is unfavorable to oil companies in advance. In that case, they will not proceed with the business and investments. Thus, governments must design an optimal fiscal regime to ensure a favorable balance of mutual relations. The government take (share of the petroleum profit) is used as a measure to compare the fiscal regimes of different countries in terms of petroleum profit going directly into the state budget and the fiscal regime attractiveness for petroleum sector investments. Accordingly, the theory indicates that government take attractiveness should also influence government effectiveness.

The theory outlined in this chapter suggests that neither the type of fiscal regime system nor the corresponding type of contract is better or worse. From the economic perspective, the same objectives can be achieved through both concessionary and production-sharing contracts. Therefore, it could be concluded that the type of contract has no influence on government effectiveness in the petroleum sector.

3 Hypothesis development

According to the theoretical findings outlined in the previous chapter, the objective of this empirical study is to examine the influence of political stability, regulatory quality, the intensity of petroleum exploration and production activities, government take (fiscal regime) attractiveness, and the type of contract on government effectiveness. Based on the theory discussed, the following hypotheses were developed.

The government effectiveness variable represents the quality of public service, the quality of civil service and its degree of independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies (World Bank, 2016). Many authors focused on government effectiveness when analyzing the petroleum governance model among various oil-producing countries together with oil-sector performance. Brunnschweiler and Bulte (2008) showed that there is a significant difference in government effectiveness in various oil-producing countries. Their empirical research suggested that better government effectiveness led to less resource dependence and higher direct investments, which in turn positively affects GDP. Like many other authors, for the government effectiveness variable, they used World Bank data, arguing that these data have the advantage of extensive coverage and objectiveness due to a large survey base, making them particularly attractive for econometric analysis (Brunnschweiler & Bulte, 2008). Kaufman et al. (2004) argued that the key advantage of the World Bank Worldwide Governance Indicators (WGI) is that despite the margins of error, these indicators are sufficiently informative that many cross-country comparisons result in statistically significant differences in estimated governance. The WGI measures six dimensions of governance, which are government effectiveness, political stability, regulatory quality, rule of law, control of corruption, and voice of accountability. Government effectiveness data published by the World Bank has also been used by other authors (Heller & Marcel, 2012; Thurber et al., 2011), aiming to compare government effectiveness in the petroleum sector among various oil-producing countries.

The political stability variable represents the level of political stability and perceptions of the likelihood of political instability and politically motivated violence (World Bank, 2016). Many authors (Falola & Genova, 2005; Shaffer, 2011; Thurber et al., 2011; Holden, 2013; Kemal, 2016) used political stability in their empirical research and showed that the level of political stability would positively influence petroleum sector governance and consequently government effectiveness in the petroleum sector. The data used in the model was pulled from WGI data published by the World Bank in 2016. Based on this, the first hypothesis was developed as follows:

- *H1: Political stability positively influences government effectiveness in the petroleum sector.*

The regulatory quality variable represents the perception of the ability of the government to formulate and implement comprehensive policies and regulations that permit and promote private sector development (World Bank, 2016). As elaborated in the previous chapter, petroleum legislation is very specific, complex, and industry standardized. Moreover, the ability of the country to implement industry-standardized petroleum legislation is very important in terms of the development of the petroleum sector. Thus, regulatory quality is another variable that, in addition to political stability, should strongly influence government effectiveness. Some of the previous research related to the petroleum governance model and respectively government effectiveness in the petroleum sector used the regulatory quality indicator (Heller & Marcel, 2012; Thurber et al., 2011). The second hypothesis is developed as follows:

- *H2: Regulatory quality positively influences government effectiveness in the petroleum sector.*

The intensity of petroleum exploration and production activities variable represents the ranking of the selected sample countries in terms of the intensity of petroleum exploration and production activities in the five years from 2010 to 2016. The ability of the country to attract investments in petroleum exploration and production activities shows the country's (government) effectiveness in maximizing its potential and revenues from petroleum (Johnston, 1994). This ability can be measured in the intensity of petroleum exploration and production activities. To rank oil-sector performance and measure effectiveness, Thurber et al. (2011) evaluated the ability of the country to develop and produce petroleum, which can only be done through investments in petroleum operations and showed that this ability positively influences petroleum sector effectiveness. The above indicates the third hypothesis:

- *H3: The intensity of petroleum exploration and production activities positively influences government effectiveness in the petroleum sector.*

The government takes the attractiveness variable, which represents the ranking among selected sample countries related to the attractiveness of the fiscal regime applied by the country in terms of economic stability and balanced share of profits between the country and the oil company for 2015. Many authors (Johnston, 2000 and 2003; Seba, 2008; Thurber et al., 2011; Holden, 2013; Kemal, 2016) have used government take in their empirical research and showed that government take attractiveness will positively influence government effectiveness in the petroleum sector. This argumentation leads to the fourth hypothesis:

- *H4: Government take attractiveness positively influences government effectiveness in the petroleum sector.*

The type of contract represents the contract used among selected sample countries when concluding deals with oil companies, i.e., the production sharing contract or concession (royalty and tax) contract. Some authors, such as energy economist Daniel Johnston, have argued that the type of contract does not influence the ability of the country to maximize petroleum profit and its effectiveness in the petroleum sector since both types can achieve the same objectives. The data used in the model were pulled from the Petroleum Economics and Policy Solutions (PEPS) data published by IHS Energy in 2016. The above indicates the fifth hypothesis:

- *H5: The type of contract used for awarding petroleum rights does not significantly influence government effectiveness in the petroleum sector.*

The following chapter outlines the methodology, including data and analytical approaches, including MLA and ANN.

4 Methodology

4.1 Data

After the variables to be used in the model were identified, descriptive statistics were applied, and the variables' descriptions were presented in Table 2.

Government effectiveness data was pulled from WGI data published by the World Bank (2016). The data represents an estimation of government effectiveness in each selected country for 2015. Countries were evaluated in the range from -2.5 to 2.5, where -2.5 indicates weak effectiveness and 2.5 indicates strong effectiveness. In order to avoid negative values, the range was adjusted by 2.5, to a range from 0 to 5, where 0 means weak and 5 means strong effectiveness.

In 2015, countries were evaluated for political stability, ranging from -2.5 to 2.5, where -2.5 means weak stability and 2.5 means strong stability. These ranges were adjusted by 2.5 to a range of 0 to 5, where 0 means weak, and 5 means strong stability.

Regulatory quality data were also pulled from the WGI data published by the World Bank (2016). The data repre-

Table 2: Description of the variables

Variable	Code	Measurement	Mean	St. Dev
Government Effectiveness	GE	0-5 (0-weak, 5-strong)	2.41	0.956
Political stability	PS	0-5 (0-weak, 5-strong)	2.21	0.968
Regulatory quality	RQ	0-5 (0-weak, 5-strong)	2.41	0.966
Intensity of exploration and production activities	EPI	1-10 (1-low, 10-high)	3.19	2.739
Government take attractiveness	GTA	1-10 (1-low, 10-high)	5.98	1.504
Type of contract	TC	0-production sharing contract, 1-concession (royalty and tax based) contract	0.40	0.492

Source: Authors' work

sents an estimation of regulatory quality in 2015 in each selected country. Countries are evaluated in the range from -2.5 to 2.5, where -2.5 means weak quality and 2.5 means strong quality. The range was adjusted by 2.5 to avoid negative values, and thus, a range from 0 to 5 was used, where 0 means weak, and 5 means strong quality.

The intensity of petroleum exploration and production activities was pulled from the Petroleum Economics and Policy Solutions data published by IHS Energy (2016). Countries were evaluated on a scale of 1 to 10, where 1 means the lowest and 10 means the highest intensity of petroleum exploration and production activities.

The same source was used to extract the data to measure government take attractiveness in 2015. Countries were evaluated on a scale of 1 to 10, where 1 means lowest, and 10 means highest value.

The type of contract was measured as a dummy variable. In the model, countries with production-sharing contracts were denoted with the number 0, while countries with a concession (royalty and tax) contract were denoted with the number 1.

4.2 Analysis

To examine the influence of the defined independent variables on the dependent variable, a full MLA is run, including all independent variables that are considered predictors of dependent variables. Since one of the variables appeared insignificant due to a low t ratio, that variable was dropped, and the reduced regression model was rerun (Azcel & Sounderpandian, 2009). One of several stepwise selection procedures is used. These techniques either select or eliminate variables, one at a time, in an effort to exclude those variables that either have no predictive ability or are highly correlated with other predictor variables (Kvanli et al., 2003). Stepwise procedures consist of forward regression, backward regression, and stepwise regression, where stepwise regression is most commonly used. Stepwise regression can remove any variable whose partial F-value indicates that this variable does not contribute, given the present set of independent variables in the model (Kvanli et al., 2003).

In the MLA, many problems may occur due to a large number of variables. The purpose of model diagnostics is to detect possible weaknesses of the model and, if necessary, to transform it. Typically, four problems (multicollinearity, heteroscedasticity, autocorrelation of error terms, and the normality of error terms) need to be analyzed in order to prove the validity of the model (Šošić, 2004). If any of the four problems are detected, the basic model assumptions are not satisfied, and the validity of the model is questionable.

To test the set hypothesis, it was necessary to examine the statistical dependence among variables, which is possible using the MLA. The MLA shows the statistical dependence of one numerical variable (dependent variable) to two or more numerical variables (independent variables). To examine the influence of selected variables on government effectiveness, an MLA was used on a sample of 130 countries worldwide. The dependent variable in the defined model is government effectiveness (GE), and the five independent variables are political stability (PS), regulatory quality (RQ), the intensity of petroleum exploration and production activities (EPI), government take attractiveness (GTA), and type of contract (TC). Data were statistically analyzed using the programs SPSS 21 and EViews 7.

The correlation matrix is used to check multicollinearity. The correlation matrix shows the correlation coefficients between the variables in the model. A serious multicollinearity problem exists if the Pearson coefficient between the variables is 0.9 or greater (Belsey et al., 2004). Other multicollinearity problem indicators are variance inflation factor (VIF) and tolerance indicator (TOL), where VIF>10 or TOL<0.1 (Hair et al., 1995; Tabachnick & Fidell, 2001; Kvanli et al., 2003; O'Brien, 2007). Some authors have

argued that there is a possibility of moderate multicollinearity if VIF>5 or TOL<0.2 (Bahovec & Erjavec, 2009). Since each of these indicators has certain advantages and disadvantages, they should both be examined to conclude whether multicollinearity exists.

Multicollinearity often appears in empirical research, especially in regression models. Although there is no exact solution for multicollinearity, independent variables that contribute to it may be excluded from the model (Kvanli et al., 2003). It is important to emphasize that VIF and TOL only indicate that the model is not ideal (Kvanli et al., 2003; O'Brien, 2007).

A two-step approach for assessing the proposed study model has been established in previous research (Sternad Zabukovšek et al., 2019). To evaluate the relevance of the constructs in the proposed conceptual model, an importance-performance map analysis was employed. Furthermore, we investigated and verified the impact of independent factors on dependent variables using artificial neural networks (ANN), a computerized method used to estimate complex and non-linear features of interactions between variables. Research by Alhumaid et al. (2021) proposes that an ANN has three separate modalities: transfer function, network design, and learning rule. To be more precise, these modalities may be classified as feed-forward multilayer perceptron (MLP) networks, radian bases, and convolutional networks. A widely used approach is the Multilayer Perceptron (MLP) network, comprising layers of inputs and outputs linked by hidden nodes. The input layer of a neural network transfers unprocessed data to the lower layers, known as "synaptic weights." The output of each layer is governed by the activation function employed, and the most effective active function suggested is the sigmoidal function (Karlik & Olgac 2011). Therefore, this work employs the ANN to train and evaluate the theoretical model, quantifying the importance of independent variables.

5 Results

5.1 Step 1: Multiple regression analysis

Based on all the information and inputs above, the MLA has the following form:

$$GE = 0.283 + 0.60 * TC + 0.033 * EPI + 0.115 * PS + 0.645 * RQ + 0.134 * GTA + \varepsilon \quad (1)$$

For the full model, all five variables were included in the model to suppose that they influence the government's effectiveness. The MLA results are presented in Table 3. W for the model. In contrast, the type of contract (TC) variable was not shown as statistically significant since its p-value was greater than 0.05 (p-value = 0.376). The coefficient of determination (R-square) is high (R2=0.869), indicating that the model fits the data well. This means that 86.9% of the variance of the dependent variable government effectiveness (GE) is explained by the inclusion of four independent variables (PS, RQ, GT, EPI, GTA, and TC).

Table 3: Variables in the full model

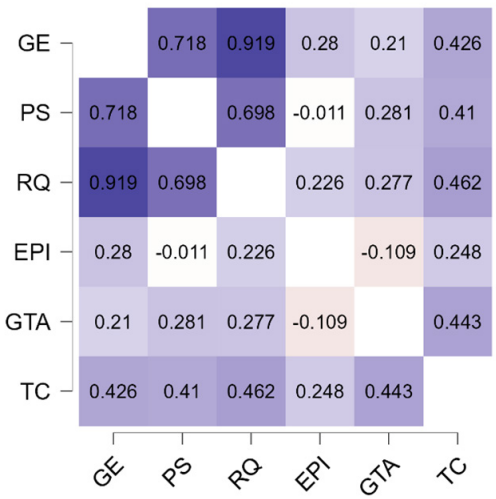
Variables	Coefficients	Standard errors	t-values	p-values	Hypothesis	Conclusion
Constant	0.283	0.142	1.995	0.048*		
PS	0.115	0.054	2.107	0.037*	H1	✓ (+5%)
RQ	0.645	0.063	10.239	<0.001**	H2	✓ (+1%)
EPI	0.033	0.011	2.896	0.004**	H3	✓ (+1%)
GTA	0.134	0.050	2.679	0.008**	H4	✓ (+1%)
TC	0.060	0.068	0.887	0.376	H5	∅

Note: ** statistically significant at 1%; * 5; Source: Authors' work

Table 4: Correlation matrix

		GE	PS	RQ	EPI	GTA	TC
GE	Pearson's r	1.000					
PS	Pearson's r	0.718**	1.000				
RQ	Pearson's r	0.919**	0.698**	1.000			
EPI	Pearson's r	0.280**	-0.011	0.226	1.000		
GTA	Pearson's r	0.210*	0.281**	0.277	-0.109	1.000	
TC	Pearson's r	0.426**	0.410**	0.462	0.248	0.443	1.000

Source: Authors' work



Source: Authors' work

Figure 3: Heatmap of the correlations between dependent and independent variables

Table 5: Tolerance (TOL) and the variance inflation factor (VIF)

Variables	TOL	VIF
PS	0.466	2.146
RQ	0.437	2.290
EPI	0.799	1.251
GTA	0.740	1.351
TC	0.617	1.621

Source: Authors' work

Results indicate that an increase in regulatory quality within a particular country will directly increase government effectiveness, which is in line with part of Hypothesis 1, defining that regulatory quality has a positive impact on government effectiveness. Besides, an increase in government take attractiveness within a particular country will directly increase government effectiveness, which is in line with the part of Hypothesis 2, defining that government take has a positive impact on government effectiveness. An increase in the intensity of petroleum exploration and production activities within a particular country will directly increase government effectiveness, which is in line with part of Hypothesis 3, defining that the intensity of petroleum exploration and production activities has a positive impact on government effectiveness. Finally, an increase in political stability within a particular country will directly increase government effectiveness, which is in line with part of Hypothesis 3, defining that political stability has a positive impact on government effectiveness. However, due to the fact that the type of contract (TC) variable did not enter into the reduced model due to its insignificance to the full model, the part of Hypothesis 5 defining that the type of contract used within the particular country does not influence government effectiveness was confirmed.

The correlation matrix and associated parameters are presented in Table 4 to test for the possible presence of multicollinearity. Among independent variables, the maximum linear correlation of 0.698 was observed between PS and RQ, while the coefficients of the linear correlations among other variables were lower. Since all Pearson's coefficients among independent variables are less than 0.9, we can conclude that there is no multicollinearity problem in the model. Figure 3 presents the heatmap of the correlations between dependent and independent variables.

Multicollinearity was also tested with tolerance and the variance inflation factor (VIF). As shown in Table 5, tolerance was higher than 0.1, and VIF was lower than 10 for all variables included in the model. Based on the results, it can be concluded that the model has no multicollinearity problem.

Additionally, the normality of residuals was tested using the Kolmogorov-Smirnov, Shapiro-Wilk, and Jarque-Bera tests. The results suggest that the empirical significance level for the Kolmogorov-Smirnov test is 0.200, the Shapiro-Wilk test is 0.786, and the Jarque-Bera test is 0.829. Accordingly, it can be concluded that at the significance level of 0.05, the null hypothesis stating that residuals are normally distributed cannot be rejected.

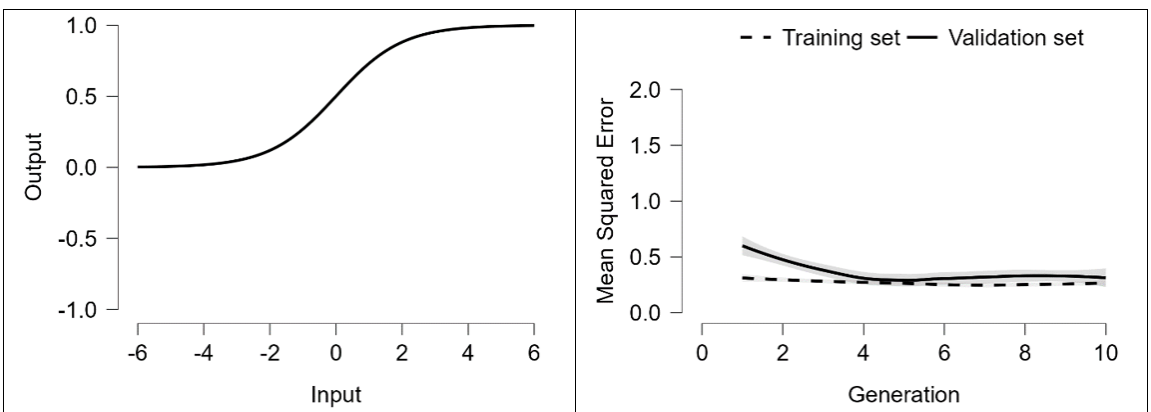
The model diagnostics have shown that each problem's analysis fulfilled the basic model assumptions and proved that the initial assumptions were not undermined.

The model diagnostics have shown that each problem's analysis fulfilled the basic model assumptions and proved that the initial assumptions were not undermined.

5.2 Step 2: Artificial neural network analysis

The ANN was conducted using JASP 0.19. The same variables were used as in the MLA. However, only those variables that were significant in the MLA were used for training in the development of the ANN, indicating that TC was discarded.

In the current study, the logistic sigmoid function aids in activating both output and hidden neurons with algorithm Rprop- (Resilient Propagation), which is a gradient descent-based optimization algorithm primarily used



(a) Logistic sigmoid activation function | *(b) Mean Squared Error Plot*

Source: Authors' work

Figure 4: Neural network training graphs

for training ANN (Figure 4a). It is a variant of the Rprop algorithm that modifies the weight updates by adapting the step sizes based on the sign of the partial derivatives of the loss function. Unlike traditional gradient descent, Rprop- ignores the magnitude of the gradient, focusing instead on its sign to decide the direction of the update, making it effective for handling vanishing gradients and improving convergence speed in training deep ANN (Igel et al., 2005). In order to reduce overfitting in the ANN, we employed cross-validation techniques with a ratio of 90:10:10 for testing, training, and validating the collected data. The ANN models exhibit relative errors of 0.200 and 0.344 for training data and testing data, respectively (Figure 4b). These results suggest that the optimum ideal number of layers for the models is 4. Based on the minimal rise in relative errors to testing from the training dataset, in conjunction with the use of ANN, it can be inferred that the suggested research models exhibit higher efficiency.

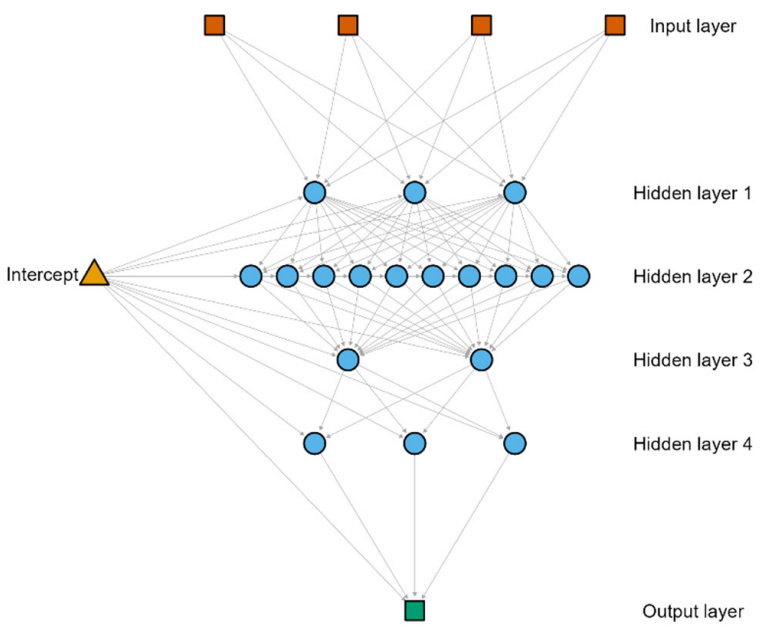
The model summary for the Neural Network Regression in Table 6 provides key metrics for evaluating the model's performance. The network consists of 4 hidden layers with 18 nodes each, and the data is split into training (n=105), validation (n=12), and test (n=13) sets. The model is optimized based on the validation set's mean squared error (MSE), which is 0.200, while the test set MSE is slightly higher at 0.344.

In the present study, the sigmoid function stimulates the activity of both output and hidden layers. The analytical method was employed to determine the optimal number of concealed layers, which was calculated to be 1 (Figure 5). Furthermore, we employed a cross-validation approach to assess and train the collected data to prevent overfitting in the ANN (Ahmed et al., 2021).

Table 6: Model Summary: Neural Network Regression

Hidden Layers	Nodes	n(Train)	n(Validation)	n(Test)	Validation MSE	Test MSE
4	18	105	12	13	0.200	0.344

Note: The model is optimized with respect to the validation set mean squared error.
Source: Authors' work



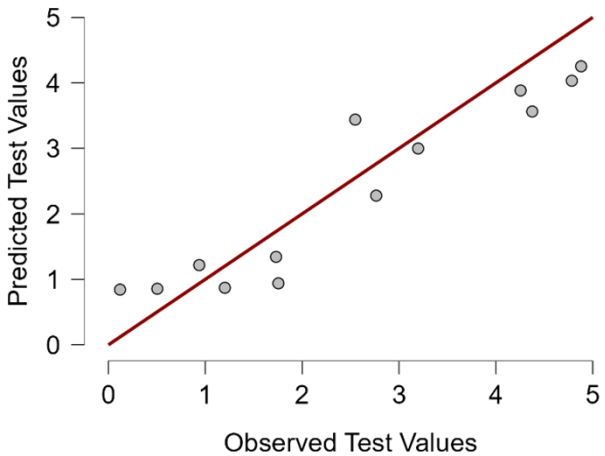
Source: Authors' work

Figure 5: Network Structure Plot

Table 7: Feature importance metrics

Mean dropout loss			
Variable	25 permutations	50 permutations	100 permutations
RQ	1.724	1.735	1.732
PS	0.631	0.635	0.641
EPI	0.609	0.612	0.613
GTA	0.559	0.558	0.555

Source: Authors' work



Source: Authors' work

Figure 6: Predictive Performance Plot

Table 7 presents the feature importance metrics, represented by the mean dropout loss, indicating the relative significance of each variable in the model. A lower mean dropout loss suggests that the variable is more important to the model's predictive capability. In this table, regulatory quality (RQ) is of the highest importance, suggesting it is the most crucial variable. Political Stability (PS) follows while Government Take Attractiveness (GTA) has the lowest importance. Different levels of permutations revealed similar results, indicating the stability of the solution.

In addition, we examined the prediction performance plot to validate the neural network's computational efficiency and precision. The neural network model of the data produced a Root Mean Square value of 0.344 and a coefficient of determination of 0.891. These values outperformed those obtained from MLS, suggesting that ANN has considerable potential for analyzing government effectiveness in the petroleum sector. Figure 6 verifies a well-defined correspondence between the observed and anticipated values of both models.

6 Conclusion

The changing relationships in global petroleum markets during the late 20th century and the increase and fluctuation of petroleum prices in the early 21st century have increased the economic importance of revenue and profit from their production. As a result, the legal relationships in petroleum exploration and production processes and the regulation of these relationships through state interventions have gradually achieved a universal value and become a crucial subject within the competence of legislative and executive government authority.

The objective of the study is to analyze the determinants that impact the effectiveness of government operations in the petroleum sector. The present study utilizes MLA to investigate the possible influence of political stability, regulatory quality, the level of petroleum exploration and production activities, government take, and contract type on government performance in the petroleum

sector. Moreover, ANN was investigated to ascertain the importance of independent variables.

The empirical research indicated that political stability influences government effectiveness in the petroleum sector and additionally stressed the importance of political stability in developing the national petroleum industry. Regulatory quality was shown to be another factor influencing government effectiveness in the petroleum sector, thus proving that petroleum legislation is the main factor in regulating the complex relationships between governments and oil companies in petroleum exploration and production activities.

Accordingly, the empirical research showed that the intensity of petroleum exploration and production activities influences government effectiveness in the petroleum sector and thus demonstrated that countries with a higher intensity of petroleum exploration and production activities also have greater government effectiveness in the petroleum sector. The correlation between government take in terms of attractiveness ranking and government effectiveness verified that countries with a more attractive government take and the fiscal regime has better government effectiveness. However, empirical research has shown that the type of contract does not influence government effectiveness in the petroleum sector.

Hypothesis H1-H4 was accepted since the model indicated that government effectiveness is positively influenced by the country's political stability, regulatory quality, intensity of petroleum exploration and production activities, and government take attractiveness. In contrast, hypothesis H5 was rejected due to the lack of a relationship between government effectiveness and type of contract.

One of the most important examinations was the empirical confirmation that the type of contract used when awarding petroleum exploration and production rights to oil companies does not influence government effectiveness. The theory presented suggested that generalizations are often made about the superiority of a concessionary system over a production-sharing system from the oil company's point of view, despite the overwhelming similarities from the economic, accounting, and financial points of view, suggesting that the choice of system may not be such a critical issue. The theory suggested that neither type of contract, concession (royalty and tax based) contract or production sharing contract, is better nor worse, as, from the economic perspective, the same objectives can be achieved. The empirical research demonstrated that the type of contract did not influence government effectiveness in the petroleum sector, thus further supporting the presented theory. This is one of the most important theoretical contributions since the theory to date has speculated based on various observations without quantification through empirical research.

The neural network analysis provided valuable insights into the key determinants of government effectiveness in the petroleum sector. The neural network model, featuring four hidden layers and 18 nodes, demonstrated that regulatory quality and political stability were the most significant variables, with the highest predictive capability. The neural network's performance, as indicated by the validation and test mean squared errors, suggests a robust model that complements the findings of the MLA.

While the analysis provided significant insights, it is important to acknowledge certain limitations. The relatively small sample size may restrict the generalizability of the findings, and the complexity of the neural network model poses a risk of overfitting despite the use of cross-validation techniques. Additionally, the study primarily focused on a specific set of variables, potentially overlooking other factors that might influence government effectiveness in the petroleum sector.

Future research should consider expanding the dataset to include a broader range of countries and varying economic contexts, which could enhance the model's robustness and applicability. Further exploration of alternative machine learning techniques, such as deep learning or ensemble methods, could provide deeper insights and improve predictions' accuracy. Additionally, incorporating external factors, such as global oil market dynamics and technological advancements in petroleum extraction, could offer a more comprehensive understanding of government effectiveness in the petroleum sector.

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Učinkovitost vlade v naftnem sektorju: dvostopenjska analiza, ki združuje linearno regresijo in umetne nevronske mreže

Ozadje in namen: Za spodbujanje razvoja naftne industrije mora država vzpostaviti regulativni okvir, ki standardizira naložbene pogoje. Cilj raziskave je bil raziskati dejavnike učinkovitosti vlade v naftnem sektorju.
Zasnova/metodologija/pristop: Izvedena je bila večkratna regresijska analiza, da bi raziskali, ali na učinkovitost vlade v naftnem sektorju vplivajo politična stabilnost države, regulativna kakovost, intenzivnost dejavnosti raziskovanja in proizvodnje nafte, vladni prevzem in vrsta uporabljene pogodbe. Dodatno smo izvedli analizo umetne nevronske mreže, da bi ugotovili pomembnost neodvisnih spremenljivk.
Rezultati: Politična stabilnost, regulativna kakovost, privlačnost vlade in intenzivnost naftnih dejavnosti pozitivno vplivajo na učinkovitost vlade. Privlačnejši državni prevzem poveča učinkovitost, medtem ko vrsta pogodbe o dodelitvi pravic do nafte ni bistveno vplivala na učinkovitost. Analiza umetne nevronske mreže je pokazala, da sta bili najpomembnejši spremenljivki regulativna kakovost in politična stabilnost.
Zaključek: Raziskava je pokazala, da so politična stabilnost, zakonodajna kakovost in intenzivnost naftnih dejavnosti ključni dejavniki za izboljšanje učinkovitosti vlade v naftnem sektorju. Te ugotovitve imajo praktične posledice, saj poudarjajo pomen stabilnega in dobro reguliranega okolja za doseganje večje učinkovitosti vlade v naftni industriji. To oblikovalce politik in strokovnjake v panogi opremi z uporabnimi vpogledi za izboljšanje uspešnosti sektorja.

Ključne besede: *Energetska politika, Učinkovitost vlade, Uspešnost naftnega sektorja, Upravljanje z naftnimi viri, Razvoj industrije*

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Using the Nominal Group Technique to Design an Appropriate Communication Strategy Among Strategic Procurement and Internal Stakeholders

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Background/Purpose: The implementation process of the procurement strategy requires consensus among internal stakeholders. An effective procurement strategy aligns with specific business requirements and accommodates the individual introversion of internal stakeholders. From the latter, we formulate our research question: How is the classification of internal procurement stakeholders designed in the validation of the procurement strategy? The research objective is to present the result in the form of a schematic description and a recommendation for a communication strategy, based on insights from existing theoretical knowledge and the formulation of professional references.

Methods: Nominal Group Technique (NGT) with 13 participants has been applied to analyze viewpoints on procurement functions. To ensure reliability and validity, Cronbach's alpha test, Spearman coefficient, and t-tests have been used.

Results and Conclusion: Study categorizes internal procurement stakeholders into four groups based on their stance towards strategy implementation: positive, cautiously positive, negatively independent, and negative stakeholders. For each group, we recommend a tailored communication strategy that includes elements such as informing, guiding, motivating, and providing credible data. The research results offer important insights into the dynamics among organizational stakeholders and how communication impacts the success of strategy implementation. We have found that under-standing and adapting to various types of stakeholders are crucial for success, from those highly involved and positively inclined to those with the potential to oppose or hinder implementation. Employing specific communication strategies for each group can significantly enhance the chances of successful implementation and sustainable execution of strategies.

Keywords: *Procurement strategy, Internal stakeholder management, Communication strategy, Nominal Group Technique, Internal communication*

1 Introduction

Supplier marketing is the practice of organizations actively interacting with suppliers, fostering robust supplier relationships, and generating value for suppliers with the expectation of receiving reciprocal value in return. Strategic procurement, a vital but relatively under-researched field, entails systematic approaches aligning with an organization's goals, encompassing sourcing, contract management, and supplier relations (O'Brien, 2019). It focuses

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on long-term planning, risk management, and value creation, enhancing efficiency and competitive edge (Tuncel et al., 2020). Our study addresses this research gap by proposing a novel, practical model for classifying internal stakeholders in strategic procurement during strategy validation and devising effective communication strategies (O'Brien 2019). Central to strategic procurement is the development and implementation of procurement strategies, with strategy validation as a crucial step to align internal stakeholder or customer consensus, recognizing their diverse assumptions impacting strategy execution (O'Brien, 2019). Our research focuses on identifying methods to classify internal stakeholders in specific organizations, ensuring alignment with the organization's overall procurement strategy, and determining effective communication (Xie et al., 2020). approaches to gain their consensus. We aim to clarify stakeholder classification (Murray-Webster & Simon, 2006) from a procurement perspective, presenting a schema for strategic procurement professionals. This schema is based on stakeholder interest in strategies, facilitating the management of communication during the strategy validation process (Ginige at al., 2018).

Effective communication planning with internal stakeholders is vital (Rowlinson, et al. 2009) in validating procurement strategies. It involves a structured and planned approach to disseminating both specific and general information across various areas. The process begins with identifying internal stakeholders, followed by selecting appropriate communication methods for engaging with them (Ortbal at al., 2016). We recommend a stepwise approach, illustrated in the process diagram provided, for classifying internal stakeholders from most opposing to most supportive. Based on classification Ginige at al., (2018) tailored communication strategies (García, 2012) are then recommended.

2 Literature Review

2.1 Procurement Strategy Implementation

Strategic planning (Dimitrova & Gallucci 2017) in organizations is crucial particularly for managing procurement strategies (O'Brien, 2019). where the validation of the strategy is a key phase. This process involves a range of procurement scenarios and diverse stakeholders with varying interests, which can sometimes conflict. These conflicts, when managed effectively, can enhance efficiency and spur innovation (Chinyio & Olomolaiye 2009). A significant challenge in this process is communication planning. It is often mistakenly assumed that all stakeholders will interpret messages uniformly (Ke, 2011). Therefore, ensuring precision and assertiveness in communication strategies is vital.

In strategy implementation, category managers must use innovative communication methods, underpinned by research and analyses of procurement category characteristics. As category management encompasses a broad organizational scope, it's vital to include stakeholders in the communication plan. This ensures that crucial messages related to the category project are effectively conveyed (Voegeli & Finger 2021).

Effective management of procurement strategies hinges on accurately identifying and understanding internal stakeholders and their interests. In strategy formulation, it's essential to categorize stakeholders by their power and interest, assessing their potential support or opposition (Cordell & Thompson, 2018). Internal stakeholders, ranging from individuals to groups within the organization, often have diverse interests and perspectives. Recognizing these differences (Bisung & Dickin, 2019) and creating synergy (Dimitrova & Gallucci, 2017) among various stakeholders is key to achieving consensus and success in strategy implementation.

2.2 The classification of internal stakeholders

Effective management of internal stakeholders, through understanding their interests and implementing clear action plans, is essential for successful procurement strategy implementation. This involves a critical analysis phase to identify and assess each stakeholder's influence and importance in strategy execution. Category managers play a key role in recognizing and addressing diverse stakeholder requirements, with the goal of minimizing conflicts, obstacles, and risks (Jilani, 2018) thereby facilitating effective collaboration and achieving organizational objectives.

Involving internal stakeholders is key for building trust, crucial for effective communication and mutual understanding, thereby enhancing strategy success through their knowledge and experience (Savage et al., 1991). Yet, caution is necessary, as stakeholders wield power and can impact strategy implementation positively or negatively (Ginige at al., 2018).

Classifying internal stakeholders is vital for creating a useful stakeholder list, assessing their impacts, and managing them effectively to achieve organizational objectives. This process includes identifying, understanding, and categorizing stakeholders for successful collaboration in activity implementation. Rowlinson et al. (2009) describes this as involving information gathering, examining stakeholder interests, strategy definition, behavior prediction, and implementing a communication strategy.

Literature review reveals that effective stakeholder understanding can be enhanced by using data in various forms, including graphical and visual representations10.

Various methods have been proposed for classifying internal stakeholders, including categorization based on risk and cooperation potential (Mitchell et al., 1997). Then classification by influence power and importance of activities, development of comprehensive processes from stakeholder identification to communication strategies (Turner & Jain, 2002). Fletcher et al., (2003) proposed emphasis on stakeholder management in relation to hierarchical structure and operational scope. Appropriate classification methods are essential for effective internal stakeholder management and control.

The 1997 model by Mitchell, Agle, and Wood classifies stakeholders based on power, legitimacy, and urgency. Power refers to the ability to influence the organization, legitimacy is the perceived validity of their claim, and urgency is the need for immediate attention (Wood, Mitchell, Agle & Bryan, 2021).

The Stakeholder Circle methodology, is introduced by Bourne and Walker (2006) as a process for categorizing internal stakeholders that includes identification, prioritization, visualization, strategy development, and communication effectiveness monitoring. While categorization often uses specific terms, caution is advised against labels like "time bomb" or "dangerous" due to potential subjectivity and risks (Chinyio & Olomolaiye 2009). Stakeholder analysis, an important management element (Raum 2018), helps identify stakeholders with significant impacts and informs engagement strategies (Ginige at al., 2018).

Effective stakeholder management in procurement necessitates multiple aspects: identifying key stakeholders, understanding their interests, leveraging their knowledge, preparing for challenges, considering their needs, and implementing engagement strategies. Managing internal stakeholders effectively involves recognizing their distinct requirements and using a 2 x 2 matrix based on power and interest for classification. This includes strategies like prioritizing collaboration for high power, high interest stakeholders, ensuring satisfaction for high power, low interest ones, monitoring needs of low power, low interest stakeholders, and regularly updating those with low power but high interest. Continuously updating this matrix is crucial for identifying stakeholders with potential unexpected demands, ensuring successful execution of procurement strategies (Chinyio & Olomolaiye 2009).

Authors like Raum (2018), emphasize the importance of analyzing internal stakeholders in strategic management, focusing on their roles, influence, and potential conflicts. Effective stakeholder management (Chinyio & Olomolaiye 2009) involves key aspects such as informing stakeholders, achieving commercial objectives, controlling their influence, and incorporating their opinions in decision-making. This encompasses the identification of stakeholders, understanding their influence and interests, establishing effective communication, managing expectations, and involving them in decision-making processes. The overarching consensus underscores the vital role of active stakeholder management in the successful execution of procurement strategies, fostering understanding, building trust, minimizing conflicts, and nurturing long-term beneficial relationships.

Recognizing internal stakeholders is key for understanding their interests and in-fluence on strategy implementation (Ginige, Amaratunga and Haigh, 2018). The first step, as advised Chinyio & Olomolaiye (2009). is to create a comprehensive and clear list of stakeholders, which is foundational for subsequent analysis. Prioritization and ranking them in a table or graphic provide an overview of key stakeholders. Identifying intersections and potential conflicts among stakeholders, as suggest Ortbal at al., (2016) is critical in stakeholder management.

Developing effective communication strategies is crucial for addressing the challenges inherent in managing internal stakeholders, particularly in complex scenarios marked by diverse interests. The significance of managing internal stakeholders is further highlighted by its role in understanding their concerns and expectations, disseminating information, and identifying uncertainties. These elements collectively enhance internal relationship management and overall process efficiency (Voegeli & Finger, 2021).

Stakeholder analysis extends beyond influence and interest to include power, support, and relationship, visually represented for clarity on maps. Stakeholders are classified into categories based on these dimensions. Key Stakeholders, with high power and interest, greatly influence implementations and include executives and advisors. Satisfied Stakeholders, often regulatory bodies, have high power but low interest and need periodic updates. Informed Stakeholders, like local or community groups, show high interest but low power, requiring regular communication and consideration. Low-Impact Stakeholders, with minimal power and interest, have a limited impact on risks, but their management is crucial if risks increase (Chinyio & Olomolaiye 2009).

Difference between internal (primary) and external (secondary) stakeholders based on their connection to a project. Internal stakeholders are directly involved, often contributing financing and having a contractual connection, while external stakeholders, though affected, are not critical to the project's survival. Stakeholders are categorized as supportive, neutral, or unsupportive, with efforts made to shift unsupportive stakeholders towards neutrality or support (Rowlinson, et al. (2009).

For successful procurement strategy implementation, stakeholder involvement is key, aligning their interests with strategy outcomes. This involves preparing a stakeholder list and assessing their potential impact on the project. Stakeholders are classified by power and interest, with tools like classification maps aiding in identifying various types, from blockers or critics to advocates or supporters

(Ginige at al., 2018).

The influence of internal stakeholders is linked to their power, stemming from their capacity to persuade or coerce. Hester uses fuzzy logic to categorize stakeholder attitudes on a scale, assigning weights to these attitudes to facilitate the transformation of non-supportive stakeholders into supporters (Chinyio & Olomolaiye 2009).

Identifying key stakeholders, whether individuals or groups, is crucial in stakeholder categorization (Chinyio & Olomolaiye 2009). Once stakeholders are identified, the next step is to define activities and integrate them based on their levels of support. Different models for categorizing internal stakeholders facilitate their identification, classification, and determination of appropriate engagement activities. Continuous monitoring of their power and interests is essential for effectively managing potential negative impacts (Chinyio & Olomolaiye 2009). Caution is advised in labelling stakeholders with terms like "Sleeping Giant" or "Time Bomb," as these can be counterproductive and sensitive, particularly if stakeholders have access to the categorization model (Ginige at al., 2018). Ensuring controlled access, careful handling, and maintaining confidentiality are crucial due to the sensitive nature of the categorization model (O'Brien, 2019).

Key principles for managing internal stakeholders include actively monitoring their interests and demands, respecting organizational procedures and stakeholder operations, identifying interdependencies, ensuring fair distribution of benefits and burdens, collaborating to mitigate risks, being aware of potential conflicts of interest, and avoiding activities that could jeopardize human rights or increase risks. Effective conflict management is crucial for successful strategy implementation. Emphasizing open communication and thorough reporting is vital, alongside pre-assessing stakeholders' needs and expectations. Building positive interpersonal relationships fosters trust, collaboration, and reduces conflict risks, preventing delays and additional costs. Early identification of potential actions, tensions, or issues is key to managing them effectively, ensuring timely responses and safeguarding strategy or project execution (Chinyio & Olomolaiye 2009).

The literature underscores the criticality of strategic planning in procurement, focusing on category managers' roles, their innovative communication methods, and stakeholder involvement. It emphasizes the need to identify and analyze internal stakeholders, considering their influence and importance for successful strategy execution. Stakeholder involvement is key to building trust and enhancing strategy effectiveness. Analyzing stakeholders' power and interest through classification matrices is crucial, as are communication strategies in stakeholder management. Continuous monitoring and conflict management through open communication are vital for maintaining harmonious stakeholder relationships (O'Brien, 2019).

2.3 Communication strategies with internal stakeholders

The critical aspects of "strategic communication," where "strategic" indicates deliberate, planned activities, and "communication" significantly affects an organization's strategic goals (García, 2022). Strategic communication management involves systematic planning and implementation of information flow through selected media, targeting specific messages to appropriate audiences at the right times (Chinyio & Olomolaiye 2009). Effective stakeholder involvement and tailored communication strategies are essential for achieving organizational goals. Building trust through effective communication among stakeholders is vital, as is maintaining a shared focus on organizational goals. Communication takes various forms, including verbal, non-verbal, written, and digital channels. Organizational communication flows through downward, upward, and horizontal pathways. Downward communication flows from top to middle management, then to subordinates. Upward communication channels feedback from lower-level employees to top management, while horizontal communication occurs among leadership, employees, owners, and department heads. Effective communication requires proper timing, simplicity, clarity, appropriateness, credibility, and style. Regular meetings and presentations, underpinned by thorough analyses, aid in effective communication. Building relationships among stakeholders through regular interviews is crucial for successful engagement (Chinyio & Olomolaiye 2009).

Gong emphasizes the necessity of fact-based communication strategies, balancing between direct and indirect approaches, and managing risks systematically through identification, analysis, and prioritization. Understanding the current situation is essential before developing strategies that align with stakeholders' needs and interests. In organizations, stakeholder relationships involve key figures who can influence organizational goals. Internal stakeholders, characterized by their influence, legitimacy, and ownership, include diverse groups affecting the organization's strategy. Stakeholder management is pivotal, requiring the identification and understanding of stakeholders' unique demands and rights. Gathering and analyzing information is crucial for effective collaboration and support in strategy execution (Chinyio & Olomolaiye 2009).

Internal stakeholders are instrumental in executing procurement strategies, advocating for interests and collective commitment to projects (Månsson, 2018). Differentiating between internal stakeholders involved in organizational activities and external stakeholders affected by these activities is essential (Jilani, 2018). Effective interpersonal communication is key to aligning and harmonizing stakeholders' interests and perceptions (Chinyio & Olomolaiye 2009).

Gaining internal stakeholder support and consensus is essential for successful procurement strategy implementation. This requires strategies that positively influence stakeholders and minimize adverse effects. Developing a comprehensive communication plan is crucial for consensus-building. Stakeholder communication management involves identifying assumption discrepancies, understanding strategy requirements, analyzing stakeholders' needs and interests, and evaluating the effectiveness of communication strategies. Effective communication with internal stakeholders is vital to harmonize relationships and align objectives. Understanding the significant impact of stakeholders on strategy execution is key. Employing tactical relationship management tools, such as matrices and categorizations, aids in effective communication. Acknowledging and responding appropriately to the diverse influences and demands of internal stakeholders is crucial for effective strategy management and implementation. Authors Chinyio V Olomolaiye (2009) outlined four tailored communication strategies for stakeholder management based on risk levels and stakeholder interest. The Collaboration Strategy focuses on stakeholder involvement in high-risk, high-interest scenarios to reduce risks and increase support. The Defence Strategy, for high-risk, low-interest situations, manages conflicts to maintain stability, building trust through clear strategic communication. The Involvement Strategy, suitable for low-risk, low-interest contexts, maintains relationships through continuous communication and information exchange. The Monitoring Strategy, applied in low-risk, high-interest situations, emphasizes closely monitoring stakeholders' interests and needs to keep them informed and engaged.

The literature emphasizes strategic communication and stakeholder management within organizations, highlighting the need for deliberate, fact-based communication strategies aligned with organizational objectives. It underscores the importance of various organizational communication pathways, such as downward, upward, and horizontal, stressing the need for clear, timely, and credible interactions. The critical role of internal stakeholders in executing procurement strategies is emphasized, requiring comprehensive identification, understanding, and management of their diverse interests, expectations, and influences on projects. Effective communication is key, with tactical relationship management recommended for its efficacy. Furthermore, the literature suggests customized communication strategies like Collaboration, Defense, Involvement, and Monitoring to manage stakeholders according to different risk levels and interests, underlining the necessity of flexible communication methods for varied stakeholder contexts.

3 Materials and Methods

3.1 The survey samples

Our research targets procurement specialists, specifically in the strategic procurement sector. Given the limited size of the professional community in this field, we focused on selecting experts with a minimum of three years of procurement experience, at least five years of overall work experience, and an age threshold of 25 years or older. These selected experts, drawn from medium-sized and large companies, were chosen based on criteria specified in the Companies Act of the Republic of Slovenia (ZGD-1), Article 55.

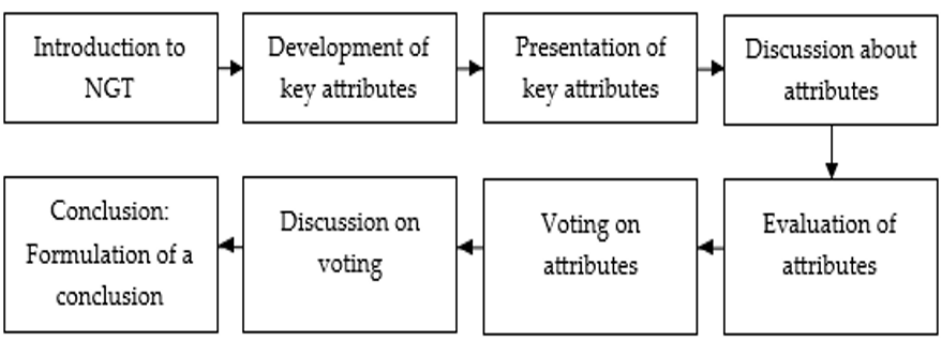

Figure 1: The approach to implementing the Nominal Group Technique

3.2 Nominal Group Technique

Our research utilized the NGT to explore stakeholder classification in strategic procurement, involving 19 strategic procurement employees responsible for strategy design and stakeholder collaboration. The NGT's systematic approach enabled us to gain insights into current classification practices within modern organizations. This qualitative method, initially developed for healthcare (in 1960s) emphasizes individual perspectives and achieves consensus through a structured process, blending interview and focus group elements. The NGT process, effective both in-person and online, involves participants expressing their views anonymously, thus encouraging open discussion without bias (Vogelnik, 2016; Jones & Hunter, 1995; Mullen et al., 2021; Mason at al., 2021).

The online approach (Fig. 1) allowed us to efficiently conduct our research while ensuring broad participant engagement. The facilitator introduces the topic, followed by individual idea contribution and group discussions (Vogelnik, 2016). Participants then rank these ideas, with the facilitator consolidating and presenting the final rankings. In our study, we adapted NGT for an online format using MS Teams, ensuring inclusivity and wider participation, as outlined in the research procedure.

Confirmation for participation was received from 14 candidates via email, followed by coordinating a meeting on MS Teams, with consideration for COVID-19 pandemic guidelines. On the meeting day, 13 participants attended, aligning with the recommended focus group size (Vogelnik, 2016), 9 to 12 experts. Though smaller groups are recommended for more in-depth discussions, with successful applications using 4 to 7 participants (Chiwire et al., 2022). We began with a 10–15-minute casual conversation to explain NGT procedures and foster a comfortable communication atmosphere, presenting the NGT execution processes and research purpose, particularly focusing on our research question. During the meeting, we introduced descriptions similar like Ginige at al., (2018) of internal stakeholders, such as "Sleeping Giant" and "Time Bomb". Assessing the relationship (Hester, 2015) between stakeholders' interest and power on a 5-point scale, we evaluated them from extremely interested to disinterested, aligning with the described stakeholder types. We then applied four communication strategies for stakeholder management as per established procedures (Chinyio & Olomolaiye 2009).

In our study, we employed the NGT to categorize internal stakeholders in strategic procurement. The process, lasting about 50 minutes, involved outlining procurement strategy management, guiding participants to identify and discuss internal stakeholders, and consolidating ten unique stakeholder profiles. These profiles include:

MENTOR: Strong, influential, and highly interested, requiring careful attention.

FRIEND: Low power but high interest and positive, serving as key advisors.

REBEL: Influential with high interest but negative attitudes, needing strategic management.

OBSTRUCTOR: Low power, highly obstructive, necessitating involvement despite challenges.

SUPPORTER: Influential and interested, albeit sometimes passive, requiring active engagement.

SPECIALIST: Low power and interest but significant in attitude, needing basic engagement.

BOMB: Powerful but low-interest, with a negative approach requiring careful mitigation.

OPPORTUNIST: Low energy and interest, demanding cautious monitoring.

SAFEGUARD: Interested and positive but indecisive, needing extra analytical verification.

TACTICIAN: Moderate interest in decision-making, requiring engagement stimulation.

Participants rated these stakeholders on a scale from 1 to 5 based on their support level. After classifying and discussing these stakeholders, the final step involved reaching group consensus on the descriptions and communication strategies, with the results incorporated into the Results chapter.

3.3 Reliability and validity of the method

In our research within the strategic procurement function, we conducted a measurement to ensure the validity, adhering to the principle of measuring precisely what we intended (Vogelnik, 2016). We identified and defined internal stakeholders, akin to types like Sleeping Giant and Time Bomb. Similar to Hester's approach, we categorized stakeholder relationships on a 5-point scale from extremely interested too uninterested. To confirm the reliability of our measurement questions, we employed the Cronbach alpha test (Cronbach, 1951), assessing the reliability coefficient as advised by relevant authors (Stadler et al., 2021; Diedenhofen & Much, 2016).

The Cronbach alpha reliability method used also Črv, (2023); Ball, (2029); Martín Martínez, and Vela Llauradó, (2022) is crucial in verifying the consistency of questionnaire measurements. The alpha coefficient (α) ranges from 0 to 1, with values closer to 1 indicating higher internal consistency. A Cronbach alpha value above 0.7 suggests good construct reliability (Diedenhofen & Much, 2016) denoting the reliability of the questionnaire's questions. We used descriptive statistics to present subject data, including respondents' age, total work experience, and procurement experience, demonstrating the participants' expertise. Spearman's correlation coefficient was employed to determine the strength of the correlation between variables, indicating a stronger association (Statstutor, 2019; Yan et al., 2029).

To check the statistical properties of the data, we used a t-test and assessed statistical significance at a significance level of 0.05. A value of (p) less than 0.05 is considered statistically significant (Yan et al., 2029). Statistical significance was calculated using the equation:

$$t = \frac{r_s \sqrt{n-2}}{\sqrt{1-r_s^2}}$$

We adopted four communication strategies for stakeholder management, akin to researchers Chinyio & Olomolaiye (2009). After finalizing the list, we categorized stakeholders by priority and interest, using tables or graphs as per author recommendations, addressing our research question.

4 Results

Using the NGT, we gathered and organized data through a structured process, guided by a facilitator. We systematically arranged the data into a table, presenting the descriptions of internal stakeholders, their communication recommendations, and their levels of interest in strategy implementation. These levels ranged from most to least supportive, shedding light on the key aspects of classifying internal stakeholders in a strategically oriented procurement function. Our study's participant group consisted of eight males and five females, ranging in age from 26 to 58, with an average age of 46.8 years. They had an average service length of 24.4 years, including an average of 15.7 years in procurement.

The reliability of our questionnaire, as indicated by a Cronbach's alpha score of 0.709, falls within the "good" range (Plešnik, 2019; Šćepanović 2020), suggesting a high level of confidence in its reliability. This score, on a scale where 1 represents perfect reliability, confirms the dependability of our research instrument.

To further validate our findings, we employed the Spearman correlation coefficient (rs), which ranges between -1 and +1 (Statstutor, 2019). A near-perfect correlation of rs = 0.997 was observed between age and total work experience. Additionally, strong correlations were found for both total work experience and procurement function experience (rs = 0.664), and between age and procurement function experience (rs = 0.666).

We also conducted a statistical t-test to observe p-values against a significance threshold of 0.0539. Our analysis revealed statistical significance (p) between respondents' age and total work experience (8.75-14), as well as between total work experience and procurement function experience (1.33-02) and between respondents' age and procurement function experience (1.30-02). These findings further reinforce the reliability of the data collected from the respondents.

Table 1: Demographic data of respondents

Respondent	sex	age	Total work experience	Total years in procurement
1	m	44	18	18
2	m	48	25	15
3	m	57	36	32
4	w	49	27	18
5	m	45	21	6
6	w	46	22	12
7	m	58	37	37
8	m	32	7	3
9	m	59	39	6
10	m	55	34	26
11	w	58	38	21
12	w	26	5	4
13	w	32	8	6

Table 2: Display of Nominal Group Technique Results

naming stakeholders	respondents													∑	variance (σ^2)	SD (σ)	median (M)
	1	2	3	4	5	6	7	8	9	10	11	12	13				
godfather	5	4	4	5	4	5	5	4	4	5	5	5	5	60	0,237	0,51	5
supporter	5	3	5	4	5	3	5	5	4	4	4	5	4	56	0,521	0,75	4
friend	4	3	4	3	4	3	4	5	3	4	4	3	4	48	0,367	0,63	4
specialist	4	3	4	3	3	3	4	4	3	3	4	4	3	45	0,249	0,52	3
safeguard	4	3	4	2	2	3	4	3	2	3	4	3	3	40	0,533	0,76	3
tactician	4	3	2	3	3	2	3	3	2	3	4	3	3	38	0,379	0,64	3
opportunist	2	2	2	3	1	2	2	2	3	2	3	2	3	29	0,331	0,60	2
bomb	3	1	3	2	1	2	2	2	1	3	2	2	3	27	0,533	0,76	2
rebel	2	1	3	1	1	1	1	2	2	2	1	2	2	21	0,391	0,65	2
obstacle	1	2	1	1	1	1	1	1	1	1	2	1	1	15	0,130	0,38	1

Table 3: Descriptions of internal stakeholders and communication recommendations

NAMING STAKE-HOLDERS	DESCRIPTION	COMMUNICATION RECOMMENDATIONS	LEVEL OF INTEREST
GODFATHER	High-status leader with significant influence and a supportive stance toward the project.	Proactively engage and tailor communication to their needs to maintain support.	60
SUPPORTER	Often a project leader, shows high interest and positivity, though may be passive.	Activate their support through engagement and motivation.	56
FRIEND	Positively inclined with low organizational power, like a colleague.	Serve as advisors and information sources	48
SPECIALIST	Key for their technical expertise despite limited power.	Keep informed and consult as technical advisors.	45
SAFEGUARD	Focused on analytical, data-driven decisions, with a generally positive outlook.	Back strategies with data and analysis, and value their verification advice.	40
TACTICIAN	Plays a critical role in decisions but has an unclear position.	Align project goals with their interests to boost engagement.	38
OPPORTUNIST	Shows low interest, engaging in minor tasks.	Communicate with caution and understanding to avoid negative impacts.	29
BOMB	In leadership but opposes the project.	Identify early and plan strategic interventions to limit their hindrance.	27
REBEL	High leadership, opposes project.	Utilize influential supporters to diminish their opposition.	21
OBSTACLE	Middle management that actively seeks to impede the project.	Illustrate the project's organizational benefits and manage their involvement carefully.	15

We analyzed our results using the Nominal Group Technique (NGT), as shown in Table 1. From 13 participants, we collected 10 names of internal stakeholders, ensuring comprehensive understanding. Table 1 presents demographic data of respondents involved in a research study focusing on procurement experts. The table outlines the sex, age, total work experience, and years in procurement for each of the 13 participants. Among these participants, there are eight males (m) and five females (w), with ages ranging from 26 to 59 years. The total work experience among the respondents varies from 5 to 39 years, indicating a wide spectrum of professional backgrounds. The years spent specifically in procurement also show diversity, ranging from 3 to 37 years. This variation in demographic and professional backgrounds of the respondents provides a comprehensive view of the experience and perspectives within the field of procurement, facilitating a robust analysis of internal stakeholder dynamics based on the substantial and varied experiences of the participants.

Descriptions were added to these names for clarity among participants. Each participant rated the stakeholders' interest levels individually using a Likert scale from 1 to 5.

In our study, we utilized descriptive statistics to analyze the diverse opinions of procurement experts on internal stakeholders. The findings revealed a spectrum of interest levels, with "obstacle" garnering the least and "godfather" the most interest. Notably, significant shifts in interest were observed, particularly from "opportunist" to "tactician", indicating a need for increased motivation during such transitions. Conversely, minor shifts from "bomb" to "opportunist" and from "tactician" to "safeguard" suggested low participation interest but high obstruction tendency, and a neutral yet positive stance towards strategy, respectively. These insights are crucial for understanding stakeholder dynamics in strategic procurement.

Statistical measures like variance (σ^2), standard deviation (σ), and median (M) re-veal the diversity in subjects' views on internal stakeholder strategy interest. Higher variance and standard deviation signify more diverse opinions. The highest dispersion is seen in "bomb" and "safeguard" ($\sigma^2 = 0.533$), and the lowest in "obstacle" ($\sigma^2 = 0.130$). The highest deviation ($\sigma = 0.76$) is also observed in "bomb" and "safeguard", while the lowest is in "obstacle" ($\sigma = 0.38$). Median values (M) indicate the majority interest rating for each stakeholder. This analysis clarifies the varied perceptions and opinions among respondents regarding different internal stakeholders.

Table 2 outlines internal stakeholders' descriptions, characteristics, and communication method recommendations, providing a clear understanding of interaction complexities in strategic procurement. This aids in managing internal stakeholders and validating procurement strategies.

Table 3 resulting from the NGT's final step, demonstrates the consensus-based classification of internal stakeholders in strategic procurement during the validation of a procurement strategy. It details stakeholders' relationships, from most to least supportive, and specifies communication strategies for low-importance procurement categories. This reflects a modern organizational emphasis on fostering individual autonomy, accountability, and active engagement through critical analysis.

5 Discussion

The discussion around the classification and management of internal stakeholders in procurement strategy validation has highlighted significant insights. It emerged from the dialogues with participants that internal stakeholders are dynamic entities; their initial positions may shift, indicating the fluid nature of stakeholder attitudes and the importance of continuous engagement and monitoring. This adaptability is particularly crucial for groups with an ambivalent stance towards the issue, underscoring the need for tailored communication strategies to address their specific needs and concerns.

The Nominal Group Technique (NGT) was chosen for its structured process, rich data generation, and consensus-building capabilities. NGT ensures equal participation, minimizing bias, and involves independent idea generation, group discussion, and ranking, ideal for complex issues like stakeholder classification. NGT produces prioritized ideas, aiding decision-making and ensuring strategies are accepted and supported. However, it can be time-consuming and relies on skilled facilitation. It may not delve as deeply into underlying reasons as other qualitative methods. Despite these limitations, NGT's strengths in structured, inclusive discussions make it effective for classifying and managing internal stakeholders in strategic procurement.

In the context of previous studies, our findings resonate with study Månsson (2018), who emphasized the criticality of the credibility of information in synthesizing perspectives from various internal stakeholders. This aspect underlines the importance of not only understanding the varied positions of stakeholders but also ensuring the reliability of the information exchanged, which forms the basis for effective communication and strategy implementation.

Our research aligns with previous studies (Chinyio & Olomolaiye 2009) in stakeholder management, particularly in developing strategies based on stakeholders' power and interest. Yet, our study stands out by tailoring communication strategies to stakeholders' attitudes, organizing them into distinct categories such as positive, undecided positive, negative independent, and outright negative. Like earlier research Chinyio & Olomolaiye (2009), we emphasize the vital role of ongoing engagement and monitoring of stakeholders in executing successful procurement

strategies. Distinguishing our work from Chinyio & Olomolaiye (2009), is our approach and depth in analyzing stakeholders. While prior research predominantly uses a power-interest grid, our study delves into stakeholders' attitudes toward strategy execution, offering a richer, more intricate understanding of their attitudes and behaviors. This method recognizes the complexities in stakeholder dynamics that go beyond simple power and interest dynamics. Our focus on rigorous data collection methods enhances the validity of our findings, demonstrating a detailed exploration of stakeholder dynamics. However, this approach necessitates regular reassessment of stakeholder attitudes, diverging from the more stationary power-interest analysis. Overall, our research, alongside previous studies, significantly advances the field of stakeholder management in procurement, with our unique emphasis on attitudes providing deeper insights into the nuances of stakeholder relationships

Our study introduces a straightforward method for stakeholder categorization, enabling managers to swiftly identify and implement suitable communication strategies. This approach, focused on tailoring communication to each stakeholder group, aligns stakeholder attitudes directly with communication methods. In contrast, other models like Murray-Webster & Simon (2006), may necessitate more in-depth analysis, rendering them more appropriate for detailed stakeholder management scenarios. In summary, our research offers a simpler method for stakeholder categorization and communication based on attitude. Other studies (Murray-Webster & Simon, 2006) provide more elaborate frameworks, encompassing power, interest, and attitude, suitable for more detailed applications in stakeholder management.

Our study enhances the understanding of stakeholder management in procurement by offering a detailed perspective on internal stakeholder dynamics. We categorize stakeholders into distinct groups - positive, undecided positive, negative independent, and negative - each with tailored communication strategies. This approach illuminates the complex and diverse attitudes of stakeholders, aiding in crafting adaptable and effective communication methods. Nevertheless, the fluid nature of stakeholder positions and our focus on procurement limit the generalizability of our findings, indicating the need for regular strategy reassessment and broader applicability. Future research should delve into how stakeholder attitudes evolve over time and the long-term effectiveness of these communication strategies in varied organizational contexts, thereby enriching the overall understanding of stakeholder management in different business sectors.

6 Conclusion

Our research marks a significant advancement in understanding stakeholder dynamics for strategic implementation within organizations. It stands out by categorizing stakeholders into four groups based on their attitudes towards procurement strategy, thereby offering managers a refined, adaptable framework for customizing communication and leadership strategies, leading to more efficient and sustainable strategy implementation. This innovative approach enhances the effectiveness of stakeholder engagement, responding to the dynamic nature of stakeholder attitudes and is applicable across various countries and industries, addressing universal dynamics. Our study not only contributes to stakeholder management literature but also provides practical tools for managers, supported by robust statistical validation using Cronbach's alpha and Spearman's correlation coefficients, and further reinforced by t-tests. This approach, which aligns communication strategies with distinct stakeholder groups, adds a novel dimension to stakeholder management, underlining the intricate relationship between stakeholder attitudes and effective communication.

This study's limitations stem from its narrow sample and focus on private sector procurement within a particular nation, potentially affecting the universality of its findings. The specific context may not reflect the varied dynamics of larger, diverse populations or other organizational environments, and differences in cultural, economic, and regulatory aspects could impact the efficacy of the strategies and stakeholder categorizations proposed. Additionally, the fluid nature of communication in stakeholder management suggests that strategies successful in our context may not translate universally. Consequently, the study's insights, while valuable for a specific national context, have limited broader application. Future research should include longitudinal and cross-industry studies in diverse cultural settings to broaden stakeholder management understanding, develop globally applicable communication models, and contribute to establishing international standards in this domain.

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Uporaba tehnike nominalne skupine za oblikovanje ustrezne komunikacijske strategije med strateškimi nabavnimi in notranjimi deležniki

Namen: Proces implementacije nabavne strategije zahteva doseganje konsenza med notranjimi deležniki. Učinkovita strategija se usklajuje s specifičnimi poslovnimi zahtevami in hkrati upošteva edinstvene značilnosti notranjih deležnikov. Namen te študije je obravnavati raziskovalno vprašanje: Kako je zasnovana klasifikacija notranjih nabavnih deležnikov med validacijo nabavne strategije? Cilj je predstaviti ugotovitve v obliki shematičnega opisa in priporočil za komunikacijsko strategijo, pri čemer se opiramo na obstoječa teoretična spoznanja in strokovne reference.
Metode: Študija uporablja tehniko nominalne skupine (NGT) z 13 udeleženci za analizo perspektiv glede nabavnih funkcij. Za zagotavljanje zanesljivosti in veljavnosti ugotovitev raziskava uporablja Cronbachov alfa test, Spearmanov korelacijski koeficient in t-test.
Rezultati in zaključek: Študija klasificira notranje nabavne deležnike v štiri skupine glede na njihov odnos do implementacije strategije: pozitivni, previdno pozitivni, negativno neodvisni in negativni deležniki. Za vsako skupino je priporočena prilagojena komunikacijska strategija, ki vključuje elemente, kot so obveščanje, usmerjanje, motiviranje in zagotavljanje verodostojnih podatkov. Raziskava ponuja pomembne vpoglede v dinamiko med organizacijskimi deležniki in vpliv komunikacije na uspešnost implementacije strategije. Razumevanje in prilagajanje različnim vrstam deležnikov je ključno za uspeh, od tistih, ki so močno vključeni in pozitivno naravnani, do tistih, ki lahko nasprotujejo ali ovirajo implementacijo. Uporaba specifičnih komunikacijskih strategij za vsako skupino lahko bistveno poveča verjetnost uspešne in trajnostne izvedbe strategij.

Ključne besede: *Strategija nabave, Upravljanje notranjih deležnikov, Komunikacijska strategija, Tehnika nominalne skupine, Notranja komunikacija*

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The Effect of Brand Association and Brand Image on the Brand Awareness of Lithuanian Companies of Digital Products

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Purpose: Brand awareness enables brand recognition in different market conditions, which is very important for companies selling digital products or providing digital services. Purpose of this paper is to determine the effect of brand association and brand image on the brand awareness of Lithuanian companies of digital products. These factors are important and have an impact on brand awareness, but their impact on the brand awareness of digital products in particular has not been investigated.
Methods: A questionnaire was conducted to a sample of 403 consumers who buy and use digital products in Lithuania. The Multiple Linear Regression (MLR) model was created and a statistically significant direct positive impact of brand association and brand image on brand awareness of companies of digital products was determined.
Results: The empirical research of the effect of brand association and brand image on the brand awareness of Lithuanian companies of digital products revealed a statistically significant direct positive impact of brand association and brand image on brand awareness of companies of digital products. The strongest direct positive impact of brand image on brand awareness than brand association.
Conclusion: The findings of research provide valuable insights into the crucial role played by brand association and brand image in building brand awareness for companies of digital products.

Keywords: *Brand Awareness, Brand Association, Brand Image, Digital Products*

1 Introduction

Brand awareness is one of the most important factors for companies of digital products, as it influences consumer recognition and familiarity with their brands in the highly competitive digital marketplace. Brand awareness is closely related to brand recognition and consumer memories of the brand (Ramadani and Rachmawati, 2022), which is very important in the digital space with high competition between digital products or services. Building and maintaining strong brand awareness can lead to increased customer trust, loyalty, and a competitive edge, enabling digital product companies to attract and retain customers effectively. Effective digital marketing strategies, consistent branding, and engaging content play pivotal roles in enhancing brand awareness for companies offering digital products, fostering lasting connections with their target audience and driving business growth. Brand awareness indicates that consumers can identify and remember a brand, which establishes a foundation for future long-term commitment between consumers and brands (Liu et al., 2020).

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Organizations are facing frustration in measuring brand perceptions like brand awareness (Phulpoto et al., 2018) because the market of digital products has its own specifics and with the rapid growth of this market, not enough research has been done on brand awareness of companies of digital products. Although new digital products can penetrate the market much more quickly which can raise brand awareness much faster than for physical products (Basu and Muylle, 2023), ensuring a high brand awareness is quite difficult due to the large number of competitors. If the research carried out on the market of usual physical products shows that brands association for many products is similar for consumers and non-customers of a product especially for mobile phones (Phulpoto et al., 2018), then in order to identify and improve the brands association of companies of digital product, many additional challenges. Researchers studying brand awareness of usual physical products indicate that there are two main constructs that are most important in improving brand awareness: these are brand association and brand image, which have strong links with brand awareness (Shabbir et al., 2017; Bilgin, 2018; Bernarto et al., 2020; Liu et al., 2020; Abbas et al., 2021).

Considering the aforementioned relevance of brand awareness for companies of digital products and the problems arising from it, the aim of this paper is to determine the effect of brand association and brand image on the brand awareness of Lithuanian companies of digital products.

2 Literature Review

2.1 Brand Awareness of Companies of Digital Products

Brand awareness of companies of digital products refers to the extent to which consumers recognize and are familiar with a particular brand and its offerings in the digital marketplace. Brand awareness is the ability of a potential customer to recognize or remember that a brand is part of a particular digital product (Ilyas et al., 2020; Mahaputra and Saputra, 2021; Pina and Dias, 2021). Brand awareness refers to the awareness of a brand's existence and its association with a specific product (Clarissa and Bernarto, 2022). Brand awareness enables brand recognition in different market conditions, which is very important for companies selling digital products or providing digital services. The higher the brand association in the digital product, the more it will be remembered by the consumer and be loyal towards the brand (Sasmita and Mohd Suki, 2015). Brand awareness indicates that consumers can identify and remember a brand, which establishes a foundation for future long-term commitment between consumers and brands (Liu et al., 2020).

2.2 Link between Brand Association and Brand Awareness of Companies of Digital Products

Brand association is important to the customer, especially when there are too many products on the market, as digital products or digital services proliferate. Brand association helps the customer identify the digital product brand they need that best meets their needs and expectations (Shamsudin et al., 2020). The link between brand association and brand awareness in companies of digital products lies in the power of consumer perceptions and associations (Das, 2020; Supiyandi et al., 2022).

Positive brand associations established through effective marketing campaigns and positive customer experiences contribute significantly to the overall brand awareness of companies offering digital products, as consumers are more likely to identify and engage with brand they hold favorable associations with (Wirtz et al., 2013; Schivinski et al., 2016; Hamzah et al., 2021). Results show that there is correlation between brand awareness, brand association and brand loyalty (Phulpoto et al., 2018).

Companies of digital products can strategically leverage brand association to enhance brand awareness by creating meaningful connections with their target audience, thereby solidifying their position in the competitive digital sector.

In the light of the mentioned explanations the following hypothesis can be proposed: *H1. Brand association has positive effect on brand awareness of companies of digital products.*

2.3 Link between Brand Image and Brand Awareness of Companies of Digital Products

Brand image and brand awareness are two major brand variables that measure the effectiveness of marketing strategies in brand management practice (Esch et al., 2006; Liu et al., 2020).

The relationship between brand image and brand awareness in digital product companies highlights the importance of overall brand perception and visual representation in influencing consumer recognition and awareness (Marques et al., 2020; Makrides et al., 2020; Pina and Dias, 2021).

A well-designed and consistent brand image across all digital platforms increases brand awareness by allowing consumers to quickly recognize and differentiate a company's products from competitors in the digital realm. Companies producing digital products must invest in developing a positive and attractive brand image that matches the preferences of their target audience, thereby enhancing

brand awareness and creating a lasting impression in the minds of consumers (Shahid et al., 2017; Febriyantoro, 2020; Zaqi and Pradini, 2022).

There are studies that examine the relationship between brand image and brand awareness and it is empirically supported that the higher the brand awareness, the higher the brand image (Bilgin, 2018; Bernarto et al., 2020). Brand awareness has some connection with brand image (Abbas et al., 2021). A strong connection between brand awareness and brand image has been established (Liu et al., 2020). Using structural equation modeling approach, brand loyalty and brand image are found to have positive effects on brand awareness (Shabbir et al., 2017).

In the light of the mentioned explanations the following hypothesis can be proposed: *H2. Brand image has positive effect on brand awareness of companies of digital products.*

3 Methodology

3.1 Measures

The research was carried out using a quantitative survey – a written questionnaire. The questionnaire was constructed on the basis of an analysis of the scientific literature dealing with the three main constructs: brand awareness (BAw), brand association (BAs) and brand image (BI). The questionnaire consisted of three scales measuring brand awareness, brand association, brand image and a block of demographic questions.

A 5-item scale designed to measuring brand awareness (example of a scale item "I aware this particular product / brand that appeared in the social media") and a 5-item scale designed to measuring brand association (example of a scale item "This particular product / brand that appeared in the social media has its own personality") were adopted from Severi and Ling (2013). A 6-item scale designed to measuring brand image (example of a scale item "This brand has a high quality") were adopted from Ansary and Nik Hashim (2018). A 5-point Likert Scale is applied for measuring brand awareness, brand association and brand image, where 1 is strongly disagree and 5 – strongly agree.

The questionnaire contains demographic information: age, gender, position in the company, company size.

3.2 Research Sample

In this research, quantitative method has been used and research data has been obtained via online questionnaires shared on social media. A total of 403 Lithuanian residents who buy and use digital products participated in this research.

Demographic characteristics of the sample. The research included 403 respondents subjected to analysis: 56.33% of the sample (N=227) were female; the other 43.67% (N=176) were male. Respondents were divided by age as follows: 27.79% of the sample (N=112) were 18-28 years old; 34.00% (N=137) – 29-38 years old; 26.55% (N=107) – 39-49 years old; 10.67% (N=43) – 49-59 years old; 0.99% (N=4) were over 59 years old. The distribution of respondents by position in the company was as follows: business owners / directors – 10.17% (N=41), heads of department – 19.11% (N=77), specialists – 44.67% (N=180), workers – 17.37% (N=70); "other" was indicated by 8.68% (N=35) of respondents. 37.72% of the sample (N=152) work in a Micro enterprise, 33.0% (N=133) work in a small enterprise, 20.1% (N=81) work in a Medium enterprise, 9.18% (N=37) work in a Large enterprise.

3.3 Data Analysis

The statistical data analysis of quantitative research was performed using IBM SPSS Statistics 25.0 software.

The following main data analysis methods were applied in the research. Firstly, the descriptive statistics analysis of the research data was performed. Secondly, the Kolmogorov-Smirnov test (N=403>50) indicated that the results have a normal distribution. The reliability of the empirical research was assessed applying Cronbach's alpha criterion. In the next stage, the Exploratory Factor Analysis (EFA) were performed, to check the validity of the constructs. Data suitability for factor analysis is tested using Bartlett's Test / Criterion of Sphericity and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. After that, the Multiple Linear Regression (MLR) model was performed. Regression modeling is one of the most widely used statistical processes to estimate the relationships between dependent and independent variables (Etemadi and Khashei, 2021).

The Multiple Linear Regression (MLR) model allows the effect of brand association and brand image on the brand awareness of Lithuanian companies of digital products. The aim of this MLR method is to explain the relationship between the dependent variable (brand awareness) and two explanatory variables (brand association and brand image). The Multiple Linear Regression model (MLR) are defined by the equation (Formula 1) (Olive, 2017; Bangdiwala, 2018):

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_n x_n + \varepsilon, \quad (1)$$

where:
y – dependent variable;
x_i – independent variable;
β_i – parameter;
ε – error

4 Results

4.1 Descriptive Statistics

Descriptive statistical analysis was conducted to obtain an overview of the initial characteristics of the three constructs (brand awareness, brand association and brand image) studied. Analysis includes minimum values, maximum values, average values and standard deviations. Table 1 presents the results of testing descriptive statistical analysis.

4.2 Normality, Reliability and Validity Test

The Kolmogorov-Smirnov test (N=403>50) indicated that the results have a normal distribution.

The reliability of the empirical research was also assessed applying Cronbach's alpha criterion. In the research, the scales for measuring the constructs of brand awareness, brand association and brand image are compatible and reliable (α=0.853, α=0.905 and α=0.941, respectively) (Table 2).

Table 1: Descriptive Statistics (N=403)

Constructs	Minimum	Maximum	Mean	Std. Deviation
BAw	2.20	5.00	4.01	0.57630
BAs	2.60	5.00	3.84	0.55664
BI	2.71	5.00	4.18	0.55061

Table 2: Reliability and Validity Test (N=403)

Constructs	Items	Rotated Component Matrix[a] / Factor Loading	Cronbach's Reliability Coefficients
BAw	BAw1	0.733	0.853
	BAw2	0.598	
	BAw3	0.704	
	BAw4	0.661	
	BAw5	0.636	
BAs	BAs1	0.718	0.905
	BAs2	0.746	
	BAs3	0.753	
	BAs4	0.765	
	BAs5	0.717	
BI	BI1	0.729	0.941
	BI2	0.798	
	BI3	0.811	
	BI4	0.675	
	BI5	0.819	
	BI6	0.796	

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 7 iterations.
KMO Measure of Sampling Adequacy =0.916; p=0.000<0.05; df=630
Bartlett's Test of Sphericity / Approx. Chi-Square =5513.157

To check the validity of the constructs, the Exploratory Factor Analysis (EFA) of the obtained data was performed applying the Principal Components Analysis with Varimax rotation to determine the factor loadings. Discriminant validity was evaluated through inter-construct correlation coefficients. Data suitability for factor analysis is tested using Bartlett's Test / Criterion of Sphericity and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. It was found that the quantitative research data are suitable for the Exploratory Factor Analysis when Bartlett's Test of Sphericity is significant, since the KMO coefficient is 0.916 ($p=0.000<0.05$; $df=630$). By estimating the factor loadings from Rotated Component Matrix the convergent validity of the measurement items was obtained and composite reliabilities as standardized factor loadings are between 0.598 to 0.819 which are above than suggested level of 0.40 so they all are at significant level (Raubenheimer, 2004).

4.3 Correlations and Collinearity Statistics

Before the Multiple Linear Regression analysis, we performed a correlation analysis of the independent variables (Table 3).

The results of the correlation matrix analysis showed that the average correlation between each independent variable is between 0.617 and 0.674. The correlation coefficients of the independent variables are found to be related to the dependent variable.

The Variance inflation factors value VIF=1.630<4 (VIFs exceeding 4 warrant further investigation), and the tolerance value is 0.614, exceeding 0.10. The results show that the data variables used in this study did not have multicollinearity problems.

4.4 The Multiple Linear Regression (MLR) Model

The regression analysis in this study is carried out using Multiple Linear Regression (MLR) analysis. Table 4 presents the results on the fit of the MLR model – Model Summary. R-squared (the coefficient of determination) is a statistical metric that is used to measure how much of the variation in outcome can be explained by the variation in the independent variables.

As can be seen from Table 4, the value of R Square is 0.518, which means that the model explains 51.8 percent of brand awareness.

The information presented in Table 5 helps to assess the statistical significance of the MLR model. The statistical value of F criterion is 53.651 and the model reaches statistical significance with Sig.=0.000, $p<0.0005$. This regression model is indeed statistically significant.

Table 3: Correlations of Constructs and Collinearity Statistics (N=403)

Constructs		BAw	BAs	BI	Collinearity Statistics	
					Tolerance	VIF
Pearson Correlation	BAw[a]	1.000				
	BAs	0.617	1.000		0.614	1.630
	BI	0.674	0.622	1.000	0.614	1.630

a. Dependent Variable: Brand Awareness
p=0.000<0.05

Table 4: Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.719[a]	0.518	0.508	0.40425

a. Predictors: (Constant). Brand Image. Brand Association
b. Dependent Variable: Brand Awareness

Table 5: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	17.535	2	8.767	53.651	0.000[b]
	Residual	16.342	100	0.163		
	Total	33.877	102			

a. Dependent Variable: Brand Awareness
b. Predictors: (Constant). Brand Image. Brand Association

Table 6: Multiple Linear Regression Test Results – Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
		B	Std. Error			
1	(Constant)	0.652	0.326		1.998	0.048
	BAs	0.334	0.092	0.322	3.637	0.000
	BI	0.495	0.093	0.473	5.337	0.000

a. Dependent Variable: Brand Awareness

MLR is based on the assumption that there is a linear relationship between the dependent (brand awareness) and both independent variables (brand association and brand image). The MLR provides an indication of which of the variables included in the model contributed to the prediction of the dependent variable. This requires estimating the Standardized Coefficients Beta. As can be seen from Table 6, the highest Standardized Coefficients Beta is 0.473 (brand image), which means that this variable explains more of the variance of the dependent variable (brand awareness) than brand association (Standardized Coefficients Beta is 0.322). All variables are statistically significant, so all can be included in the equation of the regression model.

According to the values of the coefficients in Table 6, the equation of the MLR model can be constructed (Formula 2):

$$y = 0.652 + 0.334x_1 + 0.495x_2 + \varepsilon, \quad (2)$$

where:
y – Brand Awareness (dependent variable);
x_1 – Brand Association (independent variable);
x_2 – Brand Image (independent variable);
ε – error.

The explanation of the Multiple Linear Regression (MLR) equation above is as follows:

- The constant value of 0.652 in the equation represents the predicted value of brand awareness when all the independent variables are equal to zero.
- The value of the coefficient β1 has a value of 0.334, which means that for every one unit increase in brand association, the predicted value of brand awareness increases by 0.334 units with the assumption that other independent variables still have the same value. The obtained results confirm the hypothesis H1. Brand association has positive effect on brand awareness of companies of digital products.
- The value of the coefficient β2 has a value of 0.495 which means that for every one unit increase in brand image, the predicted value of brand awareness increases by 0.495 units with the assumption that other independent variables have the same value. The obtained results confirm the hypothesis H2. Brand Image has positive effect on brand awareness of companies of digital products.

5 Discussion

Digital products often face intense competition in the market (Goyal et al., 2021; Tiwari, 2022). Strong brand

association helps differentiate a company's products from competitors, making it easier for consumers to identify and choose the brand they trust and prefer (Shamsudin et al., 2020). When consumers have positive associations with a brand, they are more likely to recognize and recall the brand when making purchase decisions.

The effect of the brand association variable on the brand awareness of digital product companies shows that the brand association variable has a positive coefficient relationship with brand awareness, suggesting that the higher the brand association, the higher the brand awareness. The results obtained in this study are in agreement with those of the results of the other authors' research (Wirtz et al., 2013; Schivinski et al., 2016; Hamzah et al., 2021), stating that positive brand associations significantly to the overall brand awareness, as consumers are more likely to identify and engage with brands, they hold favorable associations with.

The effect of the brand image variable on the brand awareness of digital product companies shows that the brand image variable has a positive coefficient relationship with brand awareness, suggesting that the higher the brand image, the higher the brand awareness. The results obtained in the research agree with the results of other authors' research, e.g. brand image is found to have positive effects on brand awareness (Shabbir et al., 2017); brand awareness has some connection with brand image (Abbas et al., 2021); a strong connection between brand awareness and brand image has been established (Liu et al., 2020) and etc.

The results of the study show that it is important for companies to actively manage their brand association and brand image in order to maximize the positive effect of brand association and brand image on brand awareness.

6 Conclusion

The empirical research of the effect of brand association and brand image on the brand awareness of Lithuanian companies of digital products revealed a statistically significant direct positive impact of brand association and brand image on brand awareness of companies of digital products. Strongest direct positive impact of brand image on brand awareness than brand association.

Theoretical and practical implications. The paper is related to a deeper understanding of the brand awareness of companies of digital products phenomenon and its connections with brand association and brand image. As a practical implication, derived from the research findings, formulated the MLR model equation for brand awareness allow digital marketing professionals to better understand the influence of brand association and brand image on brand awareness and purposefully shape brand awareness.

Limitations and future research. The paper has limitations to consider when interpreting the mentioned findings. The research was carried out and the Multiple Linear Regression analysis was performed only in Lithuania, i. e. the respondents only of one country participated in the research. It is likely that cultural, economic, social, technological, and other differences would affect the results of research conducted in another country / region / continent. Thus, further research could be extended to other regions.

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Rezultati: Empirična raziskava je pokazala statistično pomemben neposreden pozitiven vpliv povezovanja z blagovno znamko in podobe blagovne znamke na prepoznavnost blagovne znamke litovskih podjetij digitalnih izdelkov. Najmočnejši neposreden pozitiven vpliv na prepoznavnost blagovne znamke ima povezovanje z blagovno znamko.
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Ključne besede: *Prepoznavnost blagovne znamke, Povezava z blagovno znamko, Podoba blagovne znamke, Digitalni izdelki*

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